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A MANUAL

OF

ORGANIC MATERIA MEDICA.

BEING A

GUIDE TO MATERIA MEDICA OF THE VEGETABLE
AND ANIMAL KINGDOMS,

FOR THE

USE OF STUDENTS, DRUGGISTS, PHARMACISTS,
AND PHYSICIANS.

BY

JOHN M. MAISCH, PHAR. D.,

PROFESSOR OF MATERIA MEDICA AND BOTANY IN THE PHILADELPHIA
COLLEGE OF PHARMACY.

SECOND EDITION.

WITH TWO HUNDRED AND FORTY-TWO ILLUSTRATIONS.

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PREFACE TO THE SECOND EDITION.

THIS work, first published three years ago, has been unavoidably out of print for fifteen months, owing to the Author's labors in connection with the third edition of *The National Dispensatory.*

The marked favor with which the *Manual* has been received by the pharmaceutical profession is highly gratifying to the Author, indicating, as it does, that he has succeeded in impressing upon the volume the characteristics he designed it to possess—convenience of method and practical applicability.

As now issued, it is substantially unaltered in arrangement, though enlarged in size, to accord with the natural growth of the subject, and to accommodate several novel features. Among these, may be mentioned a description of the most important drugs indigenous to North America, and also a list of remedies classified according to their zoological or botanical derivation, an addition which will be found to facilitate reference to drugs of allied origin. The structural characters of drugs have received increased attention, in the hope that research in this inviting field may thereby be stimulated.

Though many new extra-pharmacopœial remedies have been admitted, careful selection has been made to avoid unnecessary redundancy and they have been described in small type for the sake of brevity and distinctiveness. The series of illustrations likewise has undergone a thorough scrutiny, and its value has been enhanced by the addition of a large number of accurate engravings.

In conclusion, the Author desires to thank his friends for many valuable suggestions, and trusts they will honor him by accepting a large share of the credit, if this edition should prove more serviceable than its predecessor.

PREFACE TO THE FIRST EDITION.

WHEN, in 1867, the author was called to the Chair of Materia Medica in the Philadelphia College of Pharmacy, he seriously felt the need of a suitable text-book which could be used in connection with his lectures, and he made preparations for the publication of such a work at an early date, but the accomplishment of his purpose has been delayed from time to time. To elaborate a system of classification which should be readily comprehended and easily applied by those for whom it was intended was by no means an easy task, and the author found occasion, almost every year, either to remodel that previously selected, or to make what in his opinion seemed to be desirable improvements. The publication of *The National Dispensatory* in a measure supplied the want, at least as far as a work of reference is concerned, but, owing to its lexical arrangement, it is not well adapted for systematic instruction. Its publication, however, rendered desirable a modification of the original plan for a treatise on materia medica, and, so modified, it is now presented in a concise form, giving what may be considered the *essential* physical, histological, and chemical characters of the organic drugs, so as to render the work also a useful and reliable guide in business transactions.

Regarding the classification adopted, the author is conscious of its imperfections, but he believes it to be convenient and capable of practical application. In reference to the scope of the work, his aim has been to embrace all the drugs recognized by the United States and British Pharmacopœias, together with important old but now unofficinal drugs, and others of which the use has been recently revived or suggested, and which seem to deserve attention. Many other drugs, more particularly those which are indigenous, are more or less employed in different localities, and, in the opinion of many, may seem perhaps to be deserving of notice.

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INTRODUCTION.

In arranging the vast mass of material within our reach for the study of Materia Medica several methods may be followed.

1. An alphabetical arrangement, while it affords us all the advantages due to facility of references, lacks the essential requisites of a *systematic* investigation of the subject.

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The development of the different organs of plants and of the histological changes incident to their growth, and the botanical relations of the different natural orders and species of medicinal plants, are subjects which are foreign to the scope of our work. Their consideration is appropriate to a separate course as an introduction to the study of Materia Medica proper. The preparation of a suitable text-book is contemplated. Meanwhile, Gray's "Structural and Systematic Botany," Thomé's "Structural Botany," and Bentley's "Manual of Botany," will prove excellent books of reference and study for those who desire information, which it is not the object of this treatise to furnish on Vegetable Anatomy, Organography, and Systematic Botany.

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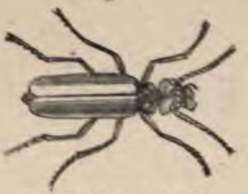
Description.—About 25 millimeters (1 inch) long, and 6 millimeters (¼ inch) broad, with filiform, in the upper part, black antennæ, and ample membranous, brownish, transparent wings, otherwise of a copper-green color, shining, of a strong and disagreeable odor. They yield a grayish-brown powder, containing green, shining particles.

Fig. 1.



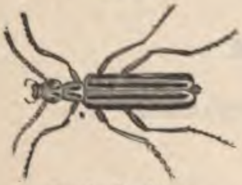
Cantharis vesicatoria.

Cantharides should be preserved in well-closed vessels with the addition of a little camphor or oil of turpentine.

Constituents.—Cantharidin, $C_{10}H_{12}O_4$ (colorless scales or prisms, soluble in alcohol, ether, chloroform, fats, volatile oils, glacial acetic acid, also in water; sublimable), also fat, various extractives, salts, etc.

Valuation.—The powder is exhausted with chloroform or acetic ether, the solution evaporated, fat and coloring matter removed by carbon disulphide; yield 0.4–0.5 per cent. cantharidin. It is with difficulty obtained in crystals from old cantharides; these may be treated with potassa and then with hydrochloric acid, or mixed with magnesia and water, dried, acidulated, deprived of oil by petroleum benzin, and exhausted with chloroform, etc.

Fig. 2.



Cantharis vittata.

Other species.—Cantharis (Epicauta, *Fabricius*) vittata, *Latreille*, potato fly, indigenous to the United States; wing-cases black, each with a yellow margin, and a yel-

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INTRODUCTION.

In arranging the vast mass of material within our reach for the study of Materia Medica several methods may be followed.

1. An alphabetical arrangement, while it affords us all the advantages due to facility of references, lacks the essential requisites of a *systematic* investigation of the subject.

2. The classification usually adopted in works intended for the use of Medical Students and Physicians is based upon a similarity in the action of drugs on the animal economy; and it presents obvious conveniences for the purpose.

3. Another method of classification is founded upon the chemical relation of substances which have a definite composition, and upon the botanical and zoological origin of organic drugs. This method has been followed by Pereira, Guibourt, Royle, and by Flückiger (Grundriss), and is employed in the "Pharmacographia" and in other valuable and instructive works. Its chief advantage, as far as Vegetable Materia Medica is concerned, is due to

the close chemical and physiological relations of the different parts of the same species, and in many instances of the different plants belonging to the same natural order. A synopsis of such classification will be found on pages ix to xxx.

4. But the primary object of Pharmacognosy or Materia Medica, as more especially adapted to the needs of the Pharmacist and the Druggist, is to enable us to recognize drugs, to determine their quality, to detect their adulteration, and to distinguish the characteristic elements of those which are closely allied. Organic drugs which resemble one another in physical and structural properties are thus naturally brought together; and the special properties of each are made the more prominent by comparison. Classifications based on these considerations have been elaborated by Berg, Schleiden, Flückiger (Lehrbuch), Wigand, and others, and for more than a quarter of a century such a system has formed the basis of instruction in Materia Medica in the Philadelphia College of Pharmacy. We have found it useful and instructive, and, with such modifications as we have thought desirable, we have adopted it in this work.

The medical properties and doses of the various drugs are briefly presented simply as matters of important information; but it is not the design of this treatise to give instruction in their therapeutical application.

The development of the different organs of plants and of the histological changes incident to their growth, and the botanical relations of the different natural orders and species of medicinal plants, are subjects which are foreign to the scope of our work. Their consideration is appropriate to a separate course as an introduction to the study of Materia Medica proper. The preparation of a suitable text-book is contemplated. Meanwhile, Gray's "Structural and Systematic Botany," Thomé's "Structural Botany," and Bentley's "Manual of Botany," will prove excellent books of reference and study for those who desire information, which it is not the object of this treatise to furnish on Vegetable Anatomy, Organography, and Systematic Botany.

A MANUAL

OF

MATERIA MEDICA.

PART I.

ANIMAL DRUGS.

THEY consist either wholly or in part of cellular tissue, except a few which are free from it. On being heated, they give off vapors having a peculiar animal empyreumatic odor, resembling the odor of burning horn or urine.

1. ANIMALS.

CANTHARIS.—CANTHARIDES.

Spanish flies.

Cantharis (Lytta, *Fabricius*) vesicatoria, *De Geer.*

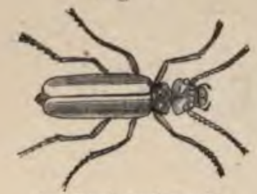
Class, Insecta; *order*, Coleoptera.

Habitat.—Southern and central Europe, mainly upon oleaceæ and caprifoliaceæ.

Collection.—By shaking the trees or shrubs, or beating the branches in the morning, and killing the insects with hot water or oil of turpentine.

Description.—About 25 millimeters (1 inch) long, and 6 millimeters (¼ inch) broad, with filiform, in the upper part, black antennæ, and ample membranous, brownish, transparent wings, otherwise of a copper-green color, shining, of a strong and disagreeable odor. They yield a grayish-brown powder, containing green, shining particles.

Fig. 1.



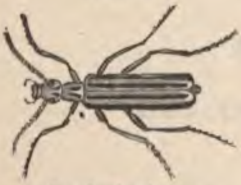
Cantharis vesicatoria.

Cantharides should be preserved in well-closed vessels with the addition of a little camphor or oil of turpentine.

Constituents.—Cantharidin, $C_{10}H_{12}O_4$ (colorless scales or prisms, soluble in alcohol, ether, chloroform, fats, volatile oils, glacial acetic acid, also in water; sublimable), also fat, various extractives, salts, etc.

Valuation.—The powder is exhausted with chloroform or acetic ether, the solution evaporated, fat and coloring matter removed by carbon disulphide; yield 0.4–0.5 per cent. cantharidin. It is with difficulty obtained in crystals from old cantharides; these may be treated with potassa and then with hydrochloric acid, or mixed with magnesia and water, dried, acidulated, deprived of oil by petroleum benzin, and exhausted with chloroform, etc.

Fig. 2.



Cantharis vittata.

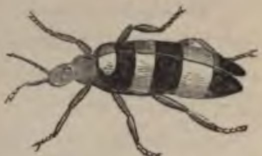
Other species.—Cantharis (Epicauta, *Fabricius*) vittata, *Latreille*, potato fly, indigenous to the United States; wing-cases black, each with a yellow margin, and a yellow stripe along the middle; contains, when fresh, 1.3 per cent. cantharidin.

Mylabris cichorii, *Fabricius*, and M. phalerata, *Pallas*.

Chinese blistering flies. Indigenous to southern and eastern Asia; black, wing-cases with two bands and at the base with two spots; bands and spots orange-yellow; contain 1.0–1.2 per cent. cantharidin.

Properties.—Diuretic, aphrodisiac, acrid poison; externally, rubefacient, vesicant. *Dose*, 0.01 to 0.07 gram (gr. $\frac{1}{6}$–gr. j), mostly in form of tincture.

Fig. 3.



Mylabris cichorii.

COCCUS.—COCHINEAL.

Coccionella.

Coccus cacti, *Linné*.

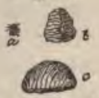
Class, Insecta; *order*, Hemiptera.

Habitat.—Mexico and Central America, upon Opuntia cochinillifera, *Miller*, and other species.

Collection.—Cultivated; the wingless females, after fecundation, increase in size; they are brushed off from the plants and killed by hot water, or the heat of an oven.

Description.—About 5 millimeters ($\frac{1}{5}$ inch) long, oblong, angular, flat or concave beneath, and with 6 short legs, convex above, annulate and wrinkled, purplish-black or gray, yielding a dark red powder, odor faint, taste slightly bitter.

Fig. 4.



Coccus cacti.—Female insect, natural size; *a*, before, and *b*, *c*, after impregnation, dry, and soaked in water.

Granilla is an inferior kind, and consists of the smaller uncultivated insects.

Adulteration.—The silvery-gray cochineal with carbonate or sulphate of barium and lead; the black cochineal with graphites, ivory black, or manganese dioxide; on maceration in water the powders are separated.

Valuation.—Exhausting with boiling distilled water, and decolorizing the cold decoction with potassium permanganate, preferably in the presence of a little indigo-carmine.

Constituents.—Carminic acid, $C_{17}H_{18}O_{10}$ (purple, amorphous, very soluble in water, alcohol, and alkalies, precipitated purple by earths, yields, with dilute acids, sugar and carmine red, $C_{11}H_{12}O_7$), fat, mucilage, salts.

Properties.—Stimulant, antispasmodic, diuretic, chiefly used for its coloring-matter. *Dose*, 0.06 to 1 gram (gr. j–xv).

Carmine is the precipitate obtained from the decoction of cochineal with alum or cream of tartar.

BLATTA.—Cockroach.

Blatta (Periplaneta, *Burmeister*) orientalis, *Linné*. *Class*, Insecta; *order*, Orthoptera.

Habitat.—Asia, now found in most parts of the world, in kitchens and damp, warm rooms.

Description.—About 25 millimeters (1 inch) long, oblong, flat; reddish-brown or black-brown; antennæ long, filiform; head hidden beneath the prothorax; wings in the male long, in the female very short; odor very disagreeable.

Constituents.—Fetid oil, extractive, antihydropin (crystallizable, not diuretic).

Properties.—Diuretic. *Dose*, 0.3 to 0.6 gram (gr. v–x), in powder or tincture.

Other species of Blatta resemble the above in odor and perhaps in properties. *B. gigantea* of the West Indies is about 5 centimeters (2 inches) long. *B. americana* of North America is 25 to 30 millimeters (1 to 1⅕ inch) long. *B. germanica* of Central Europe is 10 to 12 millimeters (about ½ inch) long.

HIRUDO.—LEECH.

1. Sanguisuga medicinalis, *Savigny;* and, 2. San. officinalis, *Sav.* *Class*, Vermes; *order*, Annulata; *sub-order*, Apoda; *family*, Hirudinea.

Habitat.—1. Central and Northern Europe (Swedish or German leech); 2. Southern Europe (Hungarian leech); in fresh-water ponds.

Description.—Body 7 to 15 centimeters (3 to 6 inches) long, smooth, soft, round, somewhat flattened, narrowed towards both ends, composed of 90 to 100 rings; posterior end terminated by a broad disk, anterior end by a narrower disk, in the centre with the mouth, containing 3 jaws each with a double row of teeth; back olive-green or blackish-green, with 6 longitudinal stripes dotted with black; belly yellowish-green or olive-green—No. 1 with numerous black spots, No. 2 with a black line on each side, unspotted. No. 1 draws readily about its own weight of blood; No. 2 draws more, and a larger amount of blood will flow after the animal has fallen.

Preservation.—In clean river water in a shady place, free from noxious vapors; temperature 10° to 20° C. (50° to 68° F.); the bottom covered or the greater part of the vessel filled with pebbles, turf, moss, some charcoal.

Leeches gorged with blood should be kept by themselves, and not used for six months or more; they may be made to disgorge the blood by placing them for a short time in a solution of table salt.

Uses.—For local depletion.

2. EGGS.

OVUM.—Egg.

Origin.—Gallus Bankiva, var. domesticus, *Temminck*, s. Phasianus Gallus, *Linné*. *Class*, Aves; *order*, Gallinæ.

Habitat.—Java and Cochinchina, domesticated.

The egg consists of the shell and lining membrane about 10 per cent., albumen 60, and yolk 30 per cent.

1. *Testa ovi*, *Egg-shell.*—Composed of 90–97 calcium carbonate, 1–5.7 calcium and magnesium phosphates, and 2–4.7 organic matter.

2. *Albumen ovi*, *White of egg.*—Weight 20 to 26 grams (ʒv–vjss). Contains 82–88 per cent. water and 12–18 per cent. solid constituents, mostly albumin, traces of fat, sugar, and extractive, and about 0.65 ash, of which 42 per cent. is KCl and 9 NaCl, the remainder being carbonates, phosphates, and sulphates of alkalies, calcium, magnesium, and iron.

3. *Vitellus ovi*, *Yolk*, *Yelk.*—Contains 48–55 water, 16 vitellin (a proteid related to casein, mixed with albumin), 30 fat, 1.5 inorganic salts (chlorides, sulphates, and phosphates of potassium, sodium, calcium, and magnesium), 0.42 cholesterin; also lecithin, coloring matter, lactic acid, sugar.

Properties and Uses.—Egg-shell is antacid. White of egg is nutritious, and used for the clarification of liquids and as an antidote to metallic poisons. Yelk is nutritious, and used for emulsionizing oils and as a dressing for burns, etc.

3. ANASTOMOSING FIBROUS TISSUE.

SPONGIA.—SPONGE.

Origin.—Spongia officinalis, *Linné.* *Class*, Poriphera; *order*, Ceratospongiæ.

Habitat.—In the sea attached to rocks.

Collection.—By diving and cutting, or the inferior kinds by tearing from the rocks with a forked instrument. The gelatinous animal matter is removed by exposure and washing.

Description.—A framework consisting of long, elastic, ramifying, and anastomosing fibres, and traversed by numerous smaller or larger cavities and pores; yellowish, brownish, or brown; soluble in potassa solution with evolution of ammonia; charred by heating, giving off empyreumatic ammoniacal vapors.

The best kind is the soft, cup-shaped Turkey sponge, imported from the Red Sea and Mediterranean Sea. The coarser sheeps'-wool, Bahama, Florida, and Nassau sponges are obtained from the West Indies.

Constituents.—Spongin (slowly soluble in cuprammonium solutions; yields with H_2SO_4 leucin and glycocoll), various salts.

Uses.—For cleaning, absorbing liquids, dilating cavities (sponge-tents); for preparing *burnt sponge, spongia usta*, by heat in covered vessels (yield 30–35 per cent.; contains silica, potassium and sodium chloride and bromide, calcium carbonate and sulphate, and about 1.8 per cent. of iodine, combined with sodium and potassium.

4. MEMBRANOUS TISSUE AND GELATINS.

ICHTHYOCOLLA.—ISINGLASS.

Colla piscium. Russian isinglass.

Origin.—Acipenser Huso, *Linné* (belugo); Ac. Güldenstädtii, *Brand et Ratzeburg* (osseter); Ac. ruthenus, *Linné* (sterlet); Ac. stellatus, *Pallas* (sewruga). *Class*, Pisces; *order*, Sturiones.

Habitat.—Caspian and Black Seas and tributary rivers.

Preparation.—The swimming bladder is cut, washed, and dried.

Description.—In separate sheets (leaf isinglass), several sheets folded together (book isinglass), or rolled and folded into various forms (staple isinglass), of horny or pearly appearance, whitish, or yellowish, semi-transparent, iridescent, inodorous, insipid; almost completely soluble in boiling water and in boiling diluted alcohol. The solution in 24 parts of hot water forms, on cooling, a transparent jelly.

Other kinds.—American isinglass. The sounds of Gadus merluccius, *Linné* (hake), and Otolithus regalis, *Cuvier* (weak fish), dried in thin sheets or ribbons.

Purse or pipe isinglass. Fish sounds dried without being cut open.

Japanese or Chinese isinglass is prepared from Eucheuma spinosum, *Agardh*, and other algæ.

Constituents.—Gelatin (glutin) with 2 (the inferior kinds sometimes 30) per cent. of membrane and 0.5 per cent. of salts.

Properties.—Emollient, nutritive, externally as a protective.

GELATINA.—GELATIN.

Preparation.—Bone, cartilage, skins, tendons, and ligaments are boiled in water until dissolved, and the resulting jelly is dried in the air.

Properties.—Thin, transparent sheets, or porous and opaque layers, or shreds; the solution in hot water is colorless and inodorous. Inferior kinds of gelatin are called glue. Its solution is not precipitated by dilute acids, alum, lead acetate, and ferric chloride; it is precipitated by tannin.

Composition.—Glutin contains about 50 per cent. C, 18 N, 6.5 H, 25 O, and 0.5 S. *Chondrin* resembles gelatin, and is obtained from the cartilages of the ribs and other non-ossifying cartilages; its solution is precipitated by tannin and by the reagents mentioned above.

Properties.—Emollient, nutritive, externally as a protective.

5. SECRETIONS AND EXCRETIONS.

a. Friable, not Fusible.

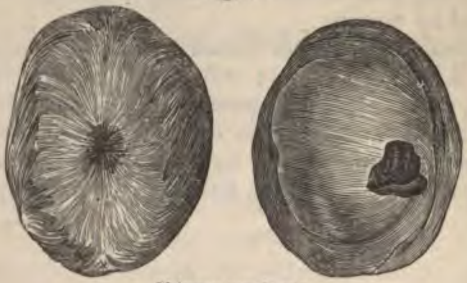
MOSCHUS.—MUSK.

Origin.—From the preputial follicles of the male animal, Moschus moschiferus, *Linné*. *Class*, Mammalia; *order*, Ruminantia.

Habitat.—Central Asia.

Description.—Irregular crummy, somewhat unctuous grains, dark reddish-brown, of a peculiar penetrating and persistent odor and bitterish taste. It is contained in oval or roundish sacs about 5 centimeters (2 inches) in diameter; on one side invested with a smoothish membrane, on the other side covered with stiff, appressed, grayish hairs concentrically arranged around two orifices near the centre; in the muscular coat with a portion of the thin penis. Strong alcohol dissolves about one-tenth the weight of musk; the tincture is light brownish-yellow, and on the addition of water becomes slightly turbid.

Fig. 5.



Chinese musk-sac.
Lower surface. Upper surface.

Water dissolves about one-half the weight of musk, the solution being deep brown, faintly acid, and strongly odorous. The secretion, freed from skin and hairs, on ignition, gives off a somewhat urine-like odor, and leaves 6 to 8 per cent. of a gray ash.

Varieties.—Chinese, Thibet or Tonquin musk is the best variety. Siberian or Russian musk is sometimes scarcely inferior, but often in flat oval sacs with thin and light hairs, the secretion compact and less aromatic (Cabardine musk). Bucharian and Assam musk is in small sacs, often with portions of the hide adhering.

Constituents.—Ammonia, an acid, cholesterin, fat, wax, gelatinous and albuminous principles. The odorous principle has not been isolated. Camphor, hydrocyanic acid, oily seeds, etc., remove the odor of musk.

Properties.—Diffusible stimulant, aphrodisiac, antispasmodic. *Dose*, 0.3 to 0.6 gram (gr. v–x), in powder, pills, or enema.

Substitutions and Adulterations.—Artificial musk bags, having none of the characters described, or the secretion partly replaced by dried blood, resin, lead, and other substances.

CASTOREUM.—CASTOR.

Origin.—From the preputial follicles of both the male and female animals Castor Fiber, *Linné*. *Class*, Mammalia; *order*, Rodentia.

Habitat.—Northern hemisphere, between 33° and 68° north latitude.

Description.—Follicles in pairs, each about 75 millimeters (3 inches) long, club-shaped, or narrow pyriform, wrinkled, brown or blackish; the inner coat iridescent, glandular, and much folded; the contents brown, hard, friable, of a peculiar odor, and of a bitter, rather acrid and nauseous taste. Alcohol dissolves about one-half of the weight of castor, the tincture being of a brown color. The decoction with water has a light brownish-yellow color, becomes turbid on cooling, and acquires a dark color with ferric chloride.

Varieties.—American or Canadian Castor. Weight of follicles between 30 and 125 grams (1 and 4 oz.); the membranes adhering firmly, the contents often rather glossy. Russian or Siberian Castor. Subglobular or roundish pyriform; weight, 75 to 250 grams ($2\frac{1}{2}$ to 8 oz.);

the outer membranes rather readily separable; the contents dull brown, of a more agreeable odor. The Russian variety is very rare.

Constituents.—Volatile oil, containing carbolic acid, 1 to 2 per cent., bitter resinous substance 14 to 58 per cent., castorin (colorless fusible needles), salicin, cholesterin, etc.; ash about 3.5 per cent.

Adulterations.—The secretion of castor sacs from diseased animals, is sometimes of a brownish-gray color, and may contain over 50 per cent. of calcium carbonate. Adulterations with earthy matters, resin, blood, etc., are rare.

Properties.—Stimulant, antispasmodic, emmenagogue. *Dose*, 0.6 to 2 grams (gr. x–xxx).

PEPSINUM.—PEPSIN.

Origin.—The mucous membrane of the stomach of the hog, Sus scrofa, *Linné* (*order*, Pachydermata), the sheep, Ovis Aries, *Linné* (*order*, Ruminantia), or the calf, Bos Taurus, *Linné* (*order*, Ruminantia). *Class*, Mammalia.

Habitat.—Domesticated.

Preparation.—By maceration or digestion in water and precipitation with sodium chloride.

Properties.—The dried membrane forms a light-brown powder. Precipitated pepsin is translucent brownish or brownish-yellow. Saccharated pepsin is mixed with milk sugar, and is an opaque, whitish, or pale-yellowish powder. It is insoluble in alcohol, almost completely soluble in water (syntonin insoluble), curdles milk, and is altered by alkalies.

Test.—Digested at 38° C. (100° F); for 6 hours a slightly opalescent solution is obtained from 1 saccharated pepsin, 500 water, and 7.5 hydrochloric acid.

Use.—In dyspeptic disorders. *Dose,* 0.5 to 1 gram (gr. viij–xv).

b. **Fusible or Soft.**

AMBRA GRISEA.—AMBERGRIS.

Origin.—Found floating on the sea; a morbid excretion in the intestines of Physeter macrocephalus, *Linné.* *Class,* Mammalia; *order,* Cetacea.

Habitat.—Indian and Southern Pacific Oceans.

Description.—Fusible in hot water; in the cold friable, gray or brown-gray, streaked and dotted; sp. grav. .91; of a peculiar fragrance, nearly tasteless; soluble in ether, volatile oils, and hot alcohol; insoluble in potassa solution.

Constituents.—Ambreïn, 85 per cent. (white, tasteless, fusible needles); balsamic extractive, etc.

Tests.—Heated upon platinum foil, no acrid vapors are evolved, and only a small residue is left.

Properties.—Stimulant, antispasmodic. *Dose,* 0.3 to 1 gram (gr. v–xv). Mostly used in perfumery.

HYRACEUM.—HYRACEUM.

Origin.—From the Klipdas, Hyrax capensis, *Cuvier.* *Class,* Mammalia; *order,* Hyracoidea.

Habitat.—Southern Africa.

Description.—Black brown, tough and plastic, partly soluble in water, less soluble in alcohol and ether; when warmed, of a castor-like odor; taste, bitter nauseous. It has been regarded by some as the dried urine, by others as the feces of the animal.

Constituents.—Volatile oil, resin, fat, various acids and salts.

Properties.—Stimulant, antispasmodic. *Dose*, 0.3 to 1 gram (gr. v–xv).

CIVETTA.—CIVET.

Zibethum.

Origin.—From glands in a pouch between the anus and genitals of the male and female animals. 1. Viverra Zibetha, *Schreber*, and, 2. Viv. Civetta, *Schreber*. *Class*, Mammalia; *order*, Carnivora.

Habitat.—1. Southern Asia, and, 2. Africa.

Description.—Unctuous, fresh yellowish, afterwards brown, fusible; almost insoluble in water, soluble in hot absolute alcohol, partly soluble in ether; odor strong, resembling musk; taste, bitterish acrid, nauseous.

Constituents.—Volatile oil, fat, resinous and coloring matters, salts.

Properties.—Stimulant, antispasmodic. *Dose*, 0.3 to 1 gram (gr. v–xv). Used in perfumery.

c. **Liquid.**

SANGUIS.—BLOOD.

Origin.—The arterial fluid of the ox, Bos Taurus, *Linné*. *Class*, Mammalia; *order*, Ruminantia.

Habitat.—Domesticated.

Properties.—Red, opaque; sp. grav. 1.05; odor peculiar; contains blood corpuscles in suspension; coagulates on exposure, separating the clot, cruor, from the liquid or serum. Evaporated, it forms extractum sanguinis or pulvis sanguinis.

Constituents.—Water about 78, albumen 7, fibrin 4, salts 9, corpuscles and other constituents about 13 per cent. The red color is due to hæmoglobin. The salts are chlorides, phosphates, and sulphates, of alkalies, calcium, and magnesium.

Properties.—Restorative. *Dose* of dried blood 0.5 to 1 gram (gr. viij–xv).

LAC.—MILK.

Lac vaccinum.

Origin.—From the mammary glands of the cow, Bos Taurus, *Linné*. *Class*, Mammalia; *order*, Ruminantia.

Habitat.—Domesticated.

Description.—White, opaque, sp. grav. 1.030; odor slight; taste, bland and sweet.

Constituents.—Water 87, solids 13, consisting of albuminoids 4.1, fat 4.0, milk sugar 4.2, and salts, chiefly phosphates with some chlorides, 0.7. The fat is emulsionized by the albuminoids (casein and lactoprotein).

Derivatives.—Cremor lactis, cream. The fat rising to the surface on standing, containing some albuminoids and serum.

Skim milk. The white liquid from which the cream has been removed, containing the albuminoids, sugar, and salts; taste bland.

Buttermilk, lac ebutyratum. The opaque liquid separated in churning the cream; contains the albuminoids, sugar, and salts; of a slight acidulous taste.

Butter, Butyrum; see Fats.

Milk sugar, Saccharum lactis; see Sugars.

Whey, Serum lactis. The opalescent liquid separated from milk after removing the albuminoids and fat, either by rennet (serum lactis dulce) or by acids or acid salts (ser. lact. acidum, aluminatum, tamarindatum, etc.). It contains the sugar and salts, also the acid or salt added.

Properties.—Nutritious.

FEL BOVIS.—OX GALL.

Fel bovinum; Fel tauri.

Origin.—From the gall-bladder of the ox, Bos Taurus, *Linné.* *Class*, Mammalia; *order*, Ruminantia.

Habitat.—Domesticated.

Description.—A viscid liquid, greenish or brownish-green; sp. grav. 1.02; neutral or faintly alkaline; odor peculiar; taste sweetish, very bitter, and nauseous; produces with sugar and strong sulphuric acid a deep red and purple color (Pettenkofer's test).

Constituents.—Water about 90 per cent., solids 10 per cent., consisting of mucilage (precipitated by 2 volumes of alcohol), bilirubin (cholepyrrhin) $C_{16}H_{13}N_2O_3$, and other coloring matters, cholesterin $C_{26}H_{44}O$, and salts, among them the sodium salts of two bitter acids, glycocholic (cholic) and taurocholic (choleic) acid; both acids give Pettenkofer's reaction, and, on being boiled with alkalies, yield cholic (cholalic) acid and, the former, glycocol; the latter, taurin.

Derivatives.—Evaporated to the consistence of an extract (fel bovis inspissatum). Purified by precipitation with alcohol, then evaporated (fel bovis purificatum s. depuratum).

Properties.—Tonic, laxative. *Dose* (of inspissated bile), 0.3 to 1 or even 4 grams (gr. v–xv–ʒj).

6. CALCAREOUS SKELETONS AND CONCRETIONS.

Almost wholly soluble, with effervescence, in hydrochloric acid.

CORALLIUM.— CORAL.

Origin.—1. Oculina virginea, *Lamarck*, and 2. Corallium rubrum, *Lamarck*. *Class*, Polypiphera.

Habitat.—Mediterranean and Atlantic Ocean.

Description.—Hard, cylindrical, branching pieces, with a more or less uneven, porous, and striate surface and a radiating interior, frequently hollow, inodorous, tasteless, white (from No. 1) or red (from No. 2).

Constituents.—Animal matter 7.75, calcium carbonate 83.25, magnesium carbonate 3.50, ferric oxide 4.25 (in red coral).

Properties.—Antacid. *Dose*, 0.3 to 2 grams (gr. v–xxx). Used in tooth powders.

OS SEPIÆ.—CUTTLEFISH BONE.

Origin.—The calcareous bone of Sepia officinalis, *Linné*. *Class*, Cephalopoda; *order*, Decapoda.

Habitat.—Mediterranean and Atlantic Ocean.

Description.—White, oval, oblong, 10 centimeters (4 inches) or more in length, flattened; both sides convex; outer surface smoothish, hard; the remainder porous and friable, inodorous; taste, earthy, somewhat saline.

Constituents.—Animal matter, 10–15 per cent.; the remainder calcium carbonate, with little sodium chloride and traces of calcium phosphate and magnesia.

Properties.—Antacid, mostly used in tooth powders.

TESTA.—Oystershell.

Conchæ, s. testa ostreæ.

Origin.—The bivalved shell of Ostrea edulis, *Linné*. *Class*, Acephala (Conchifera); *order*, Lamellibranchia.

Habitat.—Coast of the Atlantic and Indian Oceans.

Description.—Irregular roundish, oblong or obovate; hinge toothless; valves composed of imbricate foliaceous layers, externally rough, inner surface smooth, glossy, and white.

Constituents.—Animal matter 0.5–4.5 per cent., the remainder calcium carbonate, with a small proportion of calcium phosphate and sulphate, magnesia, alumina, ferric oxide, and silica.

Properties.—Antacid. *Dose*, 0.3 to 2 grams (gr. v–xxx).

TESTA OVI.—Eggshell.

(See page 30.)

CALCULI CANCRORUM.—Crabs' Stones.

Lapides, s. lapilli, s. oculi cancrorum, crabs' eyes.

Origin.—Concretions in the stomach of Astacus fluviatilis, *Fabricius*, s. Cancer Astacus, *Linné*. *Class*, Crustacea; *order*, Decapoda.

Habitat.—Northern temperate zone, in rivers.

Description.—Circular, 3 to 10 millimeters ($\frac{1}{8}$ to $\frac{3}{8}$ inch) in diameter; plano-convex; the upper side with a concentric groove; white, hard; in boiling water rose-red; on treatment with hydrochloric acid, leaving a cartilaginous plano-convex mass; inodorous, tasteless.

Constituents.—Animal matter, 12–15 per cent.; calcium carbonate, 63; calcium phosphate, 17; the remainder, magnesium phosphate and sodium salts.

Properties.—Antacid. *Dose,* 0.3 to 2 grams (gr. v–xxx).

Substitutions.—Factitious crabs' stones, treated with hydrochloric acid, leave little or no residue.

OS.—BONE.

Origin.—The skeleton of vertebrate animals.

Description.—White, smooth, internally more or less porous, insoluble in water, soluble in hydrochloric acid, leaving a gelatinous mass.

Constituents.—40 to 67 per cent. of calcium phosphate, including 5 to 10 per cent. of calcium carbonate, 1 to 2 per cent. of magnesium phosphate, and other salts. The organic ossein, yields gelatin on being boiled with water. On dry distillation, Dippel's animal oil is obtained, containing pyridine, picoline, and other bases.

Uses.—For preparing boneblack (animal charcoal) and phosphates.

PART II.

CELLULAR VEGETABLE DRUGS.

THESE consist of plants and parts of plants—all being composed of one or more kinds of cells.

1. ROOTS.—RADICES.

A root is the descending axis of a plant, and resembles the ascending axis or stem, but is destitute of leaves, and consequently does not branch by the growth of axillary buds. The pith found in the stem of dicotyledons usually descends only a short distance into the main or tap root, and the epidermis of even young roots becomes uneven and obliterated by the formation of cork; with these exceptions, the tissues of the root and their arrangement resemble those of the stem. Roots are destitute, or nearly so, of chlorophyll.

Annual roots, separated from the other portions of the plant, are not employed in medicine; the officinal roots derived [illegible] biennial or perennial herbs emanate from a short [illegible]se of stem) bearing leaf scars and pro- [illegible] own being several- or many-headed in [illegible] roots of shrubs and trees are desti- [illegible]. In the monocotyledons the tap [illegible] developed, but in its place appear [illegible]ous roots (rootlets) of about equal thickness and length, and usually not branched, though frequently beset with fibres. Adventitious roots are also met with in dictotyledons, and emanate, as in the monocotyledons, from the base or other parts of the stem, or from the rhizome. But the dicotyledonous roots which are medicinally employed consist generally of the main or tap root and its branches—in some cases of the latter alone. The branches at their base are often but little thinner than the main root from which they emanate, and, like the latter, are tapering towards the tip.

Histology.—The rootlets of monocotyledons (see Sarsaparilla) consist of a circle of parenchyme, which is followed by the nucleus sheath or endoderm, formed of one or sometimes two rows of thick-walled cells, and inclosing an irregular circular layer, containing a few or numerous small fibro-vascular bundles, which are never arranged in wedge-shaped rays; the centre of the rootlets is often occupied by parenchyme tissue, similar in character to that of the outer layer.

The roots of dicotyledons consist of bark, the outer layer of which is cork, followed by parenchyme, and an inner layer of bast tissue, traversed by more or less distinct medullary rays. A cambium layer containing the newly forming cells and indicated in the dried root as a dark line, separates the bark from the wood, the bundles of which are wedge-shaped, and separated from one another by medullary rays. The central pith is mostly minute or nearly wanting, except in the upper part, and occasionally for some distance in the main root; in the latter case, it becomes considerably thinner towards the tip.

Classification.

Sect. 1. Monocotyledonous Roots (Rootlets).	
Orange-brown; outer layer mealy or horn-like; taste acrid.	Sarsaparilla.
Pale brownish; outer layer spongy; taste pungently aromatic.	Vetiveria.
Sect. 2. Dicotyledonous Roots (Tap roots and branches).	
I. Fleshy roots: wood either soft or wood bundles thin, with broad medullary rays.	
1. Free from starch and inulin.	
Taste acrid; externally keeled; wood not cylindrical.	Senega.
red-brown; wood yellowish, not radiate.	Saponaria.
light brownish-gray; wood whitish, radiate.	Saponaria levantica.
Taste bitter; wood bundles thin; inner bark radiate; yellowish-brown.	Gentiana.
pale orange-brown.	Frasera.
Taste mucilaginous; externally brown-black.	Symphytum.
2. Free from starch, but containing inulin.	
Taste bitter; laticiferous vessels in bark forming concentric circles.	Taraxacum.
laticiferous vessels in bark in radiating lines.	Cichorium.
Taste acrid, burning; resin cells forming concentric circles in bark and medullary rays.	Pyrethrum.
resin cells in bark only (root thin).	Pyrethrum German.
Taste aromatic; resin cells numerous, scattered; wood bundles small.	Inula.
Taste mucilaginous and bitter; neither resin cells nor milk vessels; wood and bark radiate.	Lappa.
3. Containing starch.	
a. With laticiferous vessels in bark.	
Cork orange-brown; bark thin; laticiferous vessels few.	Asclepias tuberosa.

Light brown; subcylindrical; bark thick; wood porous, yellowish.	Apocynum cannabinum.
Pale yellowish-brown; subcylindrical; internally white.	Euphorbia Ipecacuanha.
Cork blackish; internally whitish.	Euphorbia corollata.
b. With radiating rows of resin cells in bark.	
Root stock short, divided into numerous long rootlets; resin cells large.	Angelica.
Root nearly simple, with several stout branches; resin cells small.	Angelica triquinata.
with several long branches; resin cells small.	Levisticum.
(brown cork removed) whitish; wood white.	Laserpitium.
brown-yellow; wood yellow, porous, in branching rays.	Pimpinella.
brownish-yellow; resin cells in numerous approximate rows.	Petroselinum.
brown-gray; resin cells irregular in thin bark and thick pith; wood bundles small.	Imperatoria.
In sections; tough; resin cells in irregular rows; wood bundles irregularly matted.	Sumbul.
c. Resin cells not radiating.	
Tuberous, napiform; resin cells in broad and narrow concentric circles.	Jalapa (see Tubers).
Root forked below; yellowish; resin cells in bark in concentric circles.	Panax.
Root large, somewhat branched; gray-brown; internally pinkish; resin cells scattered.	Stillingia.
Root large, nearly simple; brown-gray; internally whitish; resin cells scattered.	Ipomœa pandurata.
d. Neither resin cells nor laticiferous vessels.	
Very pungent; cylindrical; used fresh.	Armoracia.
Taste acrid; grayish; wood wedges short, numerous, in several circles.	Phytolacca.
Taste bitter; grayish-white; wood bundles small, in numerous circles, and forming many rays; usually in disks.	Bryonia.

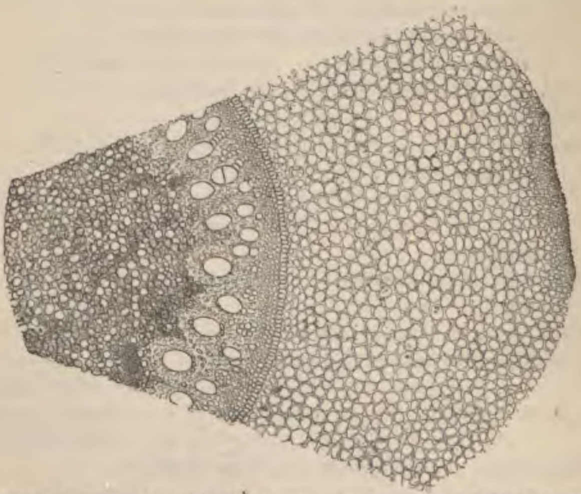
Taste mucilaginous, bitter, and astringent; grayish; wood-bundles irregular; mostly in disks or sections.	Nymphæa.
Taste acrid and bitter; cork gray-brown; internally whitish, no bast fibres; wood yellow, porous.	Belladonna.
Taste mucilaginous, insipid; (brown cork removed) white, with long bast fibres.	Althæa.
Taste sweetish, slightly acrid; deep red; thin or in powder; red color soluble in water.	Rubia.
Taste slight; bark scaly, friable, dark purple; red color insoluble in water.	Alkanna.
Taste astringent; purplish brown; internally reddish.	Heuchera.
Taste mucilaginous and bitter:	
In sections; grayish, and pale yellow; wood-bundles in distant circles.	Calumba.
Fusiform, yellowish-brown; medullary rays reddish.	Rumex.
Fusiform, brown-red; medullary rays red.	Rhaponticum.
Sections; marbled by interrupted and interwoven red medullary rays; radiate near cambium.	Rheum.
II. Woody roots: wood firm and medullary rays narrow.	
Taste sweet; color tawny-yellow internally.	Glycyrrhiza.
inner bark whitish and with laticiferous vessels.	Hemidesmus.
Taste bitterish and sweetish; color yellowish internally.	Abrus.
Taste sweetish and pungent; externally pale brown.	Hydrangea.
Taste bitter, nauseating; bark annulate.	Ipecacuanha.
bark more or less annulate, resin-dotted.	Gillenia (see Rhizomes).
bark wrinkled, contains milk vessels.	Apocynum androsæmifolium.
Taste bitter, aromatic; bark thin, light brown; wood yellowish-white, hard.	Gelsemium.

Taste spicy; wood pale reddish-brown.	Sassafras (see Woods).
Taste bitter; wood in irregularly concentric circles; pale brown.	Pareira.
wood yellow; bark foliaceous, loose, yellow.	Berberis.
bark firm, yellow.	Berberis aquifolium (see Rhizomes).
Taste bitterish, somewhat acrid; brown; wood white, indistinctly rayed.	Baptisia.
Taste astringent; reddish-brown; wood wedges narrow, yellowish.	Statice.
rust-brown; wood reddish.	Ceanothus.
rust-brown or purplish-brown; wood brownish.	Krameria.

SARSAPARILLA.—SARSAPARILLA.

Origin.—Smilax officinalis, *Kunth*, S. syphilitica, *Kunth*, S. medica, *Schlechtendal.* *Natural order*, Smilaceæ.

Fig. 6.

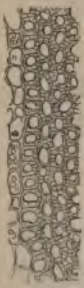


Mexican sarsaparilla.—Transverse section, microscopic appearance.

Habitat.—Tropical America from Mexico to Brazil.

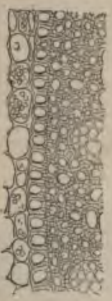
Description.—Very long, cylindrical, about 5 millimeters (^{1} inch) thick, longitudinally wrinkled, grayish-brown or orange-brown externally, white and mealy or somewhat horny internally, with a circular zone of wood-bundles around a central layer of parenchyme (pith); nearly inodorous; taste mucilaginous, bitterish, acrid. The thick woody, knotty rhizome, if present, should be removed.

Fig. 7.



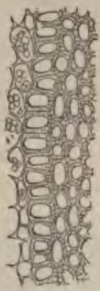
Honduras sarsaparilla.

Fig. 8.



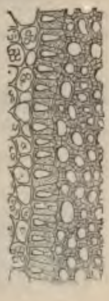
Mexican sarsaparilla.

Fig. 9.



Rio Negro sarsaparilla.

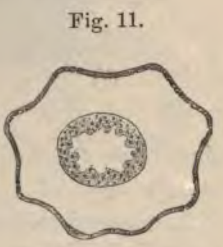
Fig. 10.



Jamaica sarsaparilla.

Sections through and near nucleus sheath, magnified 80 diam.

Fig. 11.



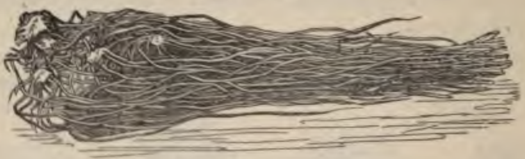
Mexican sarsaparilla, magnified 3 diam.

Structure.—Epidermis, subcuticular layer (2 or more rows of cells with thickened walls), parenchyme (so-called bark), nucleus sheath (1 row of thick-walled cells), wood zone, and central parenchyme (pith).

Varieties.—*a.* Non-mealy sarsaparillas. The parenchyme cells contain mostly a pasty mass, more rarely starch granules.

1. *Mexican sarsaparilla.* The long roots folded back over the rhizome, to which portions of the stem are often attached. Roots deeply wrinkled, with some fibres, brown-gray from adhering earth; woody and medullary zones nearly equal in width, and about half as broad as the cortical layer; nucleus sheath with the cells radially elongated, the inner cell-walls thickest. In the market as *Vera Cruz* and *Tampico sarsaparilla.*

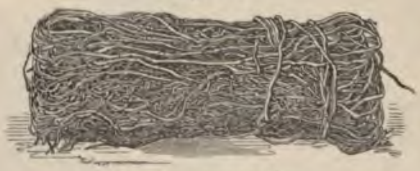
Fig. 12.



Mexican sarsaparilla.

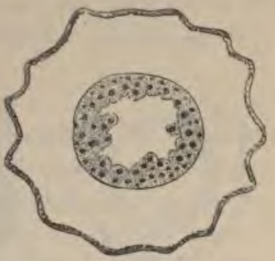
2. *Jamaica sarsaparilla.* In loose bundles with or without the rhizome; resembles the preceding, but has more fibres attached (*bearded sarsaparilla*), and surface usually more of a red tint, and less deeply wrinkled; medullary and cortical layers broader than the woody zone. Caracas sarsaparilla is probably derived from the same plant.

Fig. 13.



Jamaica sarsaparilla.

Fig. 14.

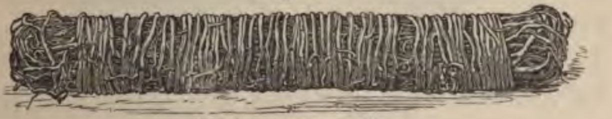


Jamaica sarsaparilla, magnified 4 diam.

b. Mealy sarsaparillas. The parenchyme cells contain starch granules, or occasionally a pasty mass.

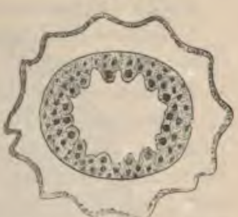
3. *Honduras sarsaparilla.* In subcylindrical bundles, tied with a root and rounded at the ends by the roots being folded back. Roots rather finely wrinkled, with few fibres, brown or gray-brown from adhering earth. Cortical and medullary layers and woody zone about alike in thickness, or the latter somewhat thinner; cells of the nucleus sheath nearly square, with large apertures, and the cell-walls evenly thickened.

Fig 15



Honduras sarsaparilla.

Fig. 16.



Honduras sarsaparilla, magnified 3 diam.

4. *Rio Negro sarsaparilla* (also called *Para* and *Lisbon sarsaparilla*). In large cylindrical rolls, neatly tied with the stem of a climbing plant, and evenly cut off at both ends. Roots finely wrinkled, dark brown or blackish-brown from adhering earth; cortical layer thick; woody zone narrow; medullary layer as broad as the cortical layer, or broader; cells

PART II.

CELLULAR VEGETABLE DRUGS.

THESE consist of plants and parts of plants—all being composed of one or more kinds of cells.

1. ROOTS.—RADICES.

A root is the descending axis of a plant, and resembles the ascending axis or stem, but is destitute of leaves, and consequently does not branch by the growth of axillary buds. The pith found in the stem of dicotyledons usually descends only a short distance into the main or tap root, and the epidermis of even young roots becomes uneven and obliterated by the formation of cork; with these exceptions, the tissues of the root and their arrangement resemble those of the stem. Roots are destitute, or nearly so, of chlorophyll.

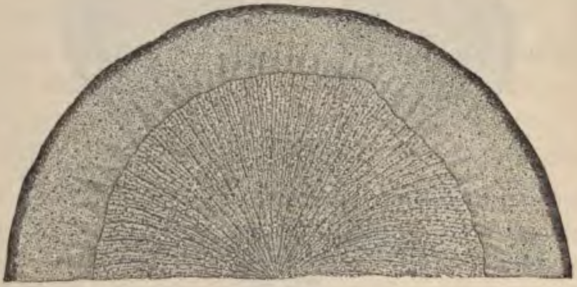
Annual roots, separated from the other portions of the plant, are not employed in medicine; the officinal roots derived from biennial or perennial herbs emanate from a short crown (base of stem) bearing leaf scars and producing buds, the crown being several- or many-headed in perennial roots; the roots of shrubs and trees are destitute of such a crown. In the monocotyledons the tap root is commonly not developed, but in its place appear a number of adventitious roots (rootlets) of about equal

Structure.—Bark thick; the small-celled inner bark present only on one side, taking the place of more or less of the outer bark, and on drying forming the keel; no bast fibres present; wood circular near the crown, below consisting of various shaped segments and rays; medullary rays delicate.

Constituents.—Polygalic acid (senegin), 5 per cent. fixed oil (containing virginic acid), pectin, coloring matter. Polygalic acid resembles saponin, dissolves in water and diluted alcohol, and is nearly insoluble in absolute alcohol.

Substitution.—The root of Pol. Boykinii, *Nuttall*, closely resembles senega, but is destitute of the keel, and has a cylindrical wood. It contains about 3 per cent. of polygalic acid, and yields a light-colored infusion and tincture. A northern variety of Polygala Senega is frequently thick, large, and less tortuous, often light colored.

Fig. 21.



False senega root, magnified 10 diam.

Properties.—Expectorant, emetic, somewhat diuretic. *Dose*, 0.2 to 1.5 grams (3 to 22 grains).

SAPONARIA.—SOAPWORT.

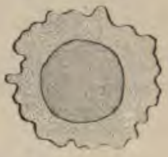
Origin.—The root of Saponaria officinalis, *Linné. Natural order*, Caryophyllaceæ.

Habitat.—Central and Southern Europe, naturalized in North America.

Description.—About 25 centimeters (10 inches) long, 2 to 4 millimeters ($\frac{1}{12}$ to $\frac{1}{6}$ inch) or more in thickness, nearly cylindrical, longitudinally wrinkled, rust-brown, internally whitish with a rather thick bark containing numerous small white crystal cells, and a pale yellow meditullium, with indistinct medullary rays; inodorous; taste sweetish, somewhat bitter, persistently acrid.

Old woody roots and the long thin runners are rarely collected.

Fig. 22.



Saponaria.
Transv. sec. 3 diam.

Constituents.—Saponin, mucilage, a little resin. Saponin, $C_{32}H_{54}O_{18}$, is a white powder, sternutatory, soluble in hot water and alcohol, the aqueous solution foaming like soap-water; by acids it is split into sugar and crystallizable *sapogenin*, which is sparingly soluble in water.

Properties.—Alterative, resembling sarsaparilla.

SAPONARIA LEVANTICA.—LEVANT SOAPROOT.

Origin.—The root of Gypsophila Struthium, *Linné. Natural order*, Caryophyllaceæ.

Habitat.—Basin of the Mediterranean.

Description.—Simple, 25 to 40 centimeters (10 to 16 inches) long, 2 to 5 centimeters ($\frac{3}{4}$ to 2 inches) thick, somewhat fusiform, with longitudinal wrinkles and transverse ridges; light brownish-gray, internally whitish, with a thickish bark and a whitish meditullium containing numerous medullary rays, and rather narrow wood-wedges; inodorous; taste sweetish, persistently acrid.

Constituents and Properties.—Similar to the preceding; mostly used in washing silk and other fabrics.

GENTIANA.—GENTIAN.

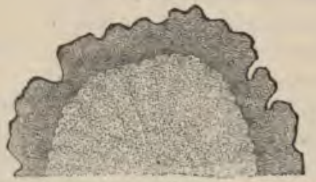
Radix gentianæ rubræ.

Origin.—Gentiana lutea, *Linné;* also G. purpurea, G. pannonica, and G. punctata, *Linné.* *Natural order*, Gentianaceæ.

Habitat.—Mountains of Central and Southern Europe.

Description.—In nearly cylindrical pieces or longitudinal slices, about 25 millimeters (1 inch) thick, the head closely annulate, the lower portion longitudinally wrinkled; externally deep yellowish-brown, internally lighter; somewhat flexible and tough when damp; rather brittle when dry; fracture short; odor peculiar, faint, more prominent when moistened; taste sweetish, persistently bitter.

Fig. 23.



Gentian.—Transverse section, magnified 3 diam.

The root of G. purpurea is shorter, thinner, and darker; that of G. pannonica is scarcely annulate, shorter, and darker; that of G. punctata little annulate, lighter, otherwise like the officinal root; they have the same properties.

Structure.—Bark rather thick, by a blackish cambium line separated from the somewhat spongy meditullium; medullary rays indistinct; bast fibres and wood fibres are wanting.

Constituents.—Gentiopicrin 0.1 per cent., gentisic acid (gentisin), gentianose (sugar) 14 per cent., pectin, fixed oil. Gentiopicrin is an amorphous or crystalline glucoside, freely soluble in water and alcohol, and yields amorphous bitter gentiogenin. Gentisic acid, $C_{14}H_{10}O_5$, crystallizes in yellow, tasteless needles, is somewhat soluble in alcohol and ether, and colors ferric salts dark brown; and a dark green color is produced by a principle which is precipitated by water from the alcoholic tincture.

Properties.—Tonic. *Dose*, 0.3 to 2 grams (gr. v–xxx).

The *American gentian root*, collected from Gentiana puberula, *Michaux*, G. Saponaria, *Linné*, and G. Andrewsii, *Grisebach*, consists of a scarcely annulated head about 12 millimeters (½ inch) long and 3 millimeters (⅛ inch) thick, and numerous nearly simple, light brown-yellow, wrinkled rootlets about 6 centimeters (2½ inches) or more long, and having a thick whitish bark and thin meditullium; odor and taste like that of gentian.

FRASERA.—AMERICAN COLUMBO.

The root of Frasera Walteri, *Michaux*. *Natural order*, Gentianaceæ.

Habitat.—United States in the Alleghanies and westward.

Description.—Mostly in longitudinal slices, about 25 millimeters (1 inch) thick, the upper portion annulate, the lower portion longitudinally wrinkled, externally pale orange-brown, internally light yellowish-brown; the bark thick, overlapping on the edges, by a brown cambium line separated from the rather spongy meditullium; odor gentian-like, more prominent when moistened; taste sweetish and bitter.

Constituents.—The same as gentian, but apparently less gentiopicrin. The yellow crystalline principle differs from gentisic acid in solubility, and in the higher melting-point.

Properties.—Tonic. *Dose*, 1 to 2 grams (gr. xv–xxx). The recent root is said to be emetic and purgative.

SYMPHYTUM.—COMFREY.

The root of Symphytum officinale, *Linné*. *Natural order*, Boraginaceæ.

Habitat.—Europe, cultivated and spontaneous in the United States.

Description.—About 15 centimeters (6 inches) long, 1 to 2 centimeters ($\frac{2}{5}$ to $\frac{4}{5}$ inch) thick, deeply wrinkled, brown-black, internally somewhat horny, whitish or when old gray, with a thickish bark, narrow wood-wedges, broad medullary rays, and, in the upper part, a thin pith; inodorous, taste sweetish, mucilaginous, and faintly astringent.

Constituents.—Mucilage, sugar, a little tannin, few starch granules, and a small quantity of asparagin.

Properties.—Demulcent, somewhat astringent. *Dose*, 8 to 15 grams (ʒij–iv) per day.

TARAXACUM.—DANDELION.

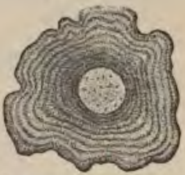
Origin.—Taraxacum Dens-leonis, *Desfontaines*, s. T. officinale, *Wiggers*, s. Leontodon Taraxacum, *Linné*. *Natural order*, Compositæ, Cichoreæ.

Habitat,—Grassy places and roadsides in Europe, naturalized in North America. Collected in the autumn.

Nearly cylindrical, about 30 centimeters (12 inches) long, above about 25 millimeters (1 inch) thick, crowned with several short thickish heads, somewhat branched, longitudinally wrinkled, externally gray-brown, internally white with a yellowish centre, when dry breaking with a short fracture; inodorous, bitter. It should be free from chicory root.

Structure.—Bark thick, white, consisting of parenchyme, and containing numerous concentric brown circles, formed by laticiferous ducts. Meditullium yellowish, porous. Medullary rays wanting.

Fig. 24.



Transverse section of taraxacum root.

Constituents.—Early in spring dandelion contains uncrystallizable sugar, which diminishes during the summer; in autumn it contains about 24 per cent. of inulin; pectin is also present. The milk-juice contains the crystalline bitter principle taraxacin, resin, a glutinous body, and taraxacerin $C_8H_{16}O$, the latter when in alcoholic solution having an acrid taste. Taraxacin is soluble in water and alcohol.

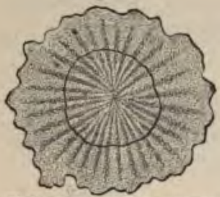
Properties.—Deobstruent, tonic in hepatic disorders, on continued use deranging digestion. *Dose*, 2 to 8 grams (ʒss–ij).

CICHORIUM.—CHICORY, SUCCORY.

Origin.—Cichorium Intybus, *Linné.* *Natural order*, Compositæ, Cichoreæ.

Habitat.—Roadsides in Europe, naturalized in North America, cultivated in Europe.

Fig. 25.



Cichorium.—Transverse section.

Description.—Chicory bears a close resemblance to dandelion; but the root of wild plants is usually lighter in color and more woody, and has a relatively thinner bark. It, like the more fleshy and darker cultivated root, is readily distinguished by the radiating arrangement of the laticiferous vessels in the bark.

Constituents.—Bitter principle, inulin, pectin, sugar.

Properties.—Deobstruent, tonic, in overdoses deranging digestion.

Dose, 1–4 grams (gr. xv to ʒj). The roasted root is used for adulterating coffee.

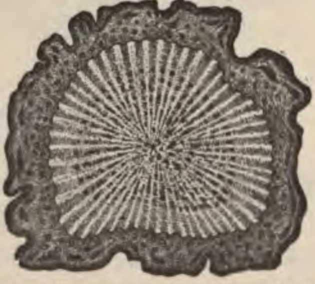
PYRETHRUM.—PELLITORY.

Radix pyrethri romani. Roman pellitory.

Origin.—Anacyclus Pyrethrum, *De Candolle. Natural order*, Compositæ, Anthemideæ.

Habitat.—Basin of the Mediterranean.

Fig. 26.



Pyrethrum.—Transverse section, magnified 3 diam.

Description.—Somewhat fusiform, nearly simple, 5 to 10 centimeters (2 to 4 inches) long, about 12 millimeters

(½ inch) thick, annulate above, wrinkled below, externally dark gray-brown, internally brownish-white, fracture short. Inodorous, pungent, and very acrid.

Structure.—Bark rather thick, containing two circles of shining axially elongated resin ducts; wood-wedges slender, yellowish; medullary rays slender, with about four circles of shining resin ducts.

Constituents. — Acrid brown resin and acrid fixed oils, one brown and soluble in potassa, the other yellow, and insoluble in potassa; much inulin, trace of tannin, mucilage.

Properties.—Irritant, rubefacient, sialagogue. *Dose,* as a masticatory 2 to 4 grams (ʒss–j).

PYRETHRUM GERMANICUM.—German Pellitory.

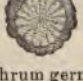
Radix pyrethri germanici.

Origin.—Anacyclus officinarum, *Hayne.* *Natural order*, Compositæ, Anthemideæ.

Habitat.—Central Europe, cultivated in Thuringia, Germany.

Description.—Nearly simple, about 5 centimeters (2 inches) long, about 3 millimeters (⅛ inch) thick, almost filiform towards the tip, finely wrinkled, brown-gray, brittle, internally brownish; odor slight; taste acrid, burning. In commerce it is usually found with the thin, almost tasteless stem, which should be separated.

Fig. 27.



Pyrethrum germanicum. —Transverse section, magnified 3 diam.

Structure.—Bark rather thick, in the outer layer one circle of distant resin ducts; wood-wedges very slender, soft.

Constituents.—Acrid resin, fixed oil, inulin, bitter principle.

Properties.—Like Roman pellitory.

INULA.—ELECAMPANE.

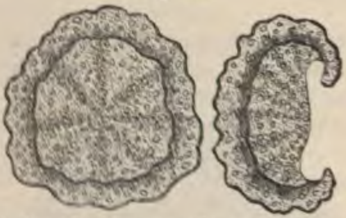
Radix inulæ s. enulæ.

Origin.—Inula Helenium, *Linné.* *Natural order*, Compositæ, Asteroideæ.

Habitat.—Central and Southern Europe, spontaneous in the United States; cultivated.

Description.—Branches of the root 15 to 30 centimeters (6 to 12 inches) long, and 2 to 2.5 centimeters (¾ to 1 inch) in diameter; in commerce nearly always in transverse concave slices or longitudinal sections with overlapping bark, externally wrinkled and brown, flexible in damp weather, when dry, breaking with a short, somewhat horny fracture, internally grayish, slightly radiate and dotted; odor peculiar, aromatic; taste bitterish, camphoraceous, aromatic.

Fig. 28.



Inula.—Transverse section, natural size.

Structure.—Bark thickish, with several irregular circles of resin ducts; wood-bundles small, forming many narrow wedges; medullary rays broader, containing numerous resin ducts.

Constituents.—Acrid resin, helenin, inulin, bitter extractive, wax, etc.; odor and camphoraceous taste are due to the volatile oil, containing alantol (inulol), having a peppermint-like odor and taste, and alantic (inulic) anhydrid, $C_{15}H_{20}O_2$, which is in needles and slightly camphor-like; helenin, C_6H_8O, is insipid.

Properties.—Stimulant, diaphoretic, diuretic, expectorant, externally rubefacient. *Dose*, 2 to 8 grams (ʒss–ij) in infusion.

LAPPA.—BURDOCK.

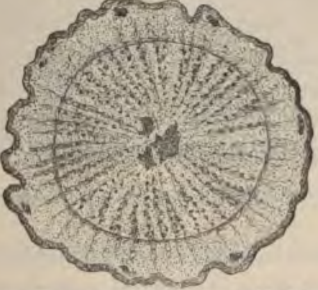
Radix bardanæ s. lappæ.

Origin.—Lappa officinalis, *Allioni.* *Natural order*, Compositæ, Cynareæ.

Habitat.—Europe and northern Asia, naturalized in North America in waste places.

Description.—Nearly simple, fusiform, 30 centimeters (12 inches) or more long, about 25 millimeters (1 inch) thick, fleshy, longitudinally wrinkled, crowned with a tuft of whitish, soft, hairy leaf-stalks; gray-brown, inter-

Fig. 29.



Lappa.—Transverse section, magnified 2 diam.

nally paler; fracture short; odor feeble, unpleasant; taste mucilaginous, sweetish, and somewhat bitter.

Structure.—Bark rather thick, without bast fibres, the inner part and the meditullium radially striate, the parenchyme often with cavities lined with snow-white remains of tissue; medullary rays rather broad; wood rays narrow, porous, destitute of wood-fibres.

Constituents.—Mucilage, sugar, inulin, bitter extractive, little tannin.

Properties.—Diaphoretic, diuretic, alterative. *Dose*, 2 to 8 grams (ʒss–ij) in decoction.

ASCLEPIAS TUBEROSA.—Pleurisy Root.

Asclepias, *U. S. P.*

Origin.—Asclepias tuberosa, *Linné.* *Natural order*, Asclepiadaceæ.

Habitat.—United States near the Atlantic coast.

Description.—Root large and fusiform, dried in longitudinal or transverse sections from 2 to 15 centimeters (¾ to 6 inches) long, and about 20 millimeters (¾ inch) or more in thickness, the head knotty, and slightly but distinctly annulate, the remainder longitudinally wrinkled; externally orange-brown, internally whitish; fracture uneven, tough; inodorous; taste bitterish and somewhat acrid. When long kept, pleurisy root acquires a gray color.

Structure.—Bark thin, in two distinct layers, the inner one whitish; wood yellowish and porous, with broad white medullary rays.

Constituents.—Principle possessing the taste of the root; soluble in alcohol, ether, and somewhat in water;

precipitated by tannin; two resins, tannin, mucilage, starch, etc.

Properties.—Sudorific, expectorant, carminative, anodyne. *Dose*, 1 to 4 grams (gr. xv–ʒj).

APOCYNUM CANNABINUM.—INDIAN HEMP.

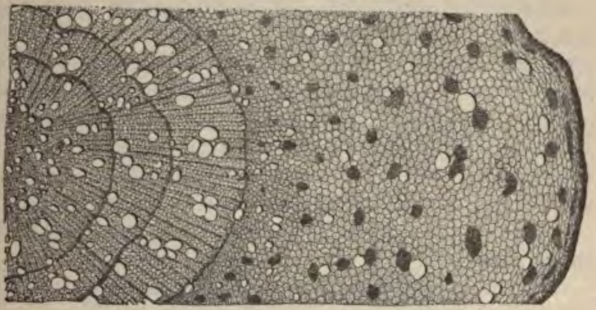
Apocynum, *U. S. P.*

Origin.—Apocynum cannabinum, *Linné. Natural odor*, Apocynaceæ.

Habitat.—United States, on the border of thickets and in grassy places.

Description.—Long, cylindrical, branched, about 6 millimeters (¼ inch) thick, pale brown, longitudinally wrinkled, somewhat fissured; fracture short, white, and pale yellow; inodorous, bitter. It is often sold in place of Apocynum androsæmifolium.

Fig. 30.



Apocynum cannabinum.—Transverse section, magnified 25 diam.

Structure.—Bark thick, covered with a thin cork layer, and containing numerous laticiferous vessels; wood yellow, soft, porous, consisting of several circles and radiate by fine medullary rays.

Constituents.—Tannin, resin, apocynin (sparingly soluble in water), apocynein (freely soluble in water), bitter extractive, starch, etc.

Properties.—Emetic, cathartic, expectorant, diuretic, antiperiodic. *Dose*, as an antiperiodic and diuretic, 0.3 gram (gr. iv–v); as an emetic, 1 to 2 grams (gr. xv–ʒss).

EUPHORBIA IPECACUANHA.—IPECACUANHA SPURGE.

American ipecac.

Origin.—Euphorbia Ipecacuanha, *Linné. Natural order*, Euphorbiaceæ.

Habitat.—United States, in sandy soil, not far from the Atlantic coast.

Description.—Several, or many-headed, branches of the head short or sometimes 5 centimeters (2 inches) long, somewhat knotty and marked with stem scars; root more than 30 centimeters (12 inches) long, about 1 centimeter ($\frac{2}{5}$ inch) thick, nearly cylindrical, somewhat branched, light brown, wrinkled, fracture short; bark rather thick, white internally; wood yellowish, spongy, inodorous, sweetish, somewhat bitter, slightly acrid.

Constituents.—Probably a glucoside, resins, euphorbon, starch, etc.

Properties.—Diaphoretic, cathartic, emetic. *Dose*, 0.3, 0.6, 1.3 gram (gr. v, gr. x, ℈j).

EUPHORBIA COROLLATA.—LARGE-FLOWERING SPURGE.

Origin.—Euphorbia corollata, *Linné. Natural order*, Euphorbiaceæ.

Habitat.—United States, in meadows; most abundant in the Southern States and west of the Alleghanies.

Description.—Many-headed: branches of the head usually short and stumpy; root 20 centimeters (8 inches) or more long, branched, subcylindrical or elongated-conical, from 5 to 25 millimeters ($\frac{1}{5}$ to 1 inch) thick, externally blackish-brown or brown-black, wrinkled and somewhat fissured, fracture short, or, in old roots, somewhat fibrous; bark rather thick, white internally; wood yellowish, soft; inodorous, sweetish, somewhat bitter, and slightly acrid.

Constituents.—Resin, mucilage, sugar, starch, etc.; probably similar to preceding.

Properties and Doses.—Diaphoretic (0.3 gm. = gr. v), cathartic (0.6 gm. = gr. x), emetic (1.3 gm. = gr. xx).

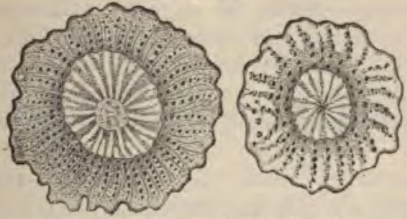
ANGELICA.—Angelica.

Origin.—Archangelica (Angelica, *Moench*) officinalis, *Hoffmann*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Central and Northern Europe; cultivated; collected in the spring of the second year.

Description.—Main root 5 to 10 centimeters (2 to 4 inches) long, 2.5 to 5 centimeters (1 to 2 inches) thick, crowned with remnants of leaf-bases, annulate; below divided into numerous nearly simple cylindrical and

Fig. 31.



Angelica—Transverse section of root-stock and rootlet, magnified 3 diam.

tuberculate wrinkled branches, which are 2 to 6 millimeters ($\frac{1}{12}$ to $\frac{1}{4}$ inch) thick, and 20 to 30 centimeters (8 to 12 inches) long; grayish-brown; fracture short. Main root with a rather thick bark, irregularly curved yellowish porous wood-wedges, and a whitish pith; branches with the spongy whitish bark rather thicker than the yellowish soft wood; bark with radiating lines of large resin ducts. Aromatic, sweetish, pungent, and bitter.

Constituents.—$\frac{1}{2}$–1 per cent. volatile oil, 6–10 per cent. resin, valerianic acid, $\frac{1}{5}$ per cent. angelic acid, $C_5H_8O_2$ (volatile, crystalline, fusible at 45° C. = 113° F., aromatic), angelicin or hydrocarotin (crystalline, pungent), sugar, bitter principle, starch, tannin.

Properties.—Carminative, stimulant, tonic, diaphoretic, in large doses emetic. *Dose*, 0.6 to 2 grams (gr. x–ʒss), in powder or infusion.

ANGELICA ATROPURPUREA.—American Angelica.

Origin.—Archangelica (Angelica, *Linné*) atropurpurea, *Hoffmann*, s. Angelica triquinata, *Michaux*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Northern and Western United States, south to Pennsylvania.

Description.—About 10 to 15 centimeters (4 to 6 inches) long and 18 millimeters ($\frac{3}{4}$ inch) thick, branched, deeply wrinkled, light brown-gray, internally whitish, fracture short, with a thick, finely resinous-dotted bark, and soft, radiating wood, aromatic, sweetish, pungent and bitter.

Constituents.—Volatile oil, volatile acid, resin, starch.

Properties and Dose.—Similar to preceding.

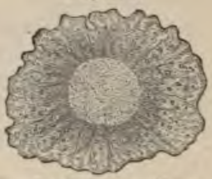
LEVISTICUM.—Lovage.

Origin.—Levisticum officinale, *Koch*, s Ligusticum Levisticum, *Linné*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Southern Europe; cultivated in Germany.

Description.—Head 5 to 10 centimeters (2–4 in.) long and 4 centimeters ($1\frac{3}{5}$ inch) thick, branched, annulate; below divided into a few nearly simple, subcylindrical, and deeply wrinkled branches, which are about 20 centimeters (8 inches) long and 2 to 6 millimeters ($\frac{1}{12}$ to $\frac{1}{4}$ inch) thick; brown or reddish-brown; fracture short, spongy. Head branches with a rather thick bark, and yellowish porous wood, which is radiate near the bark, and in irregular meshes towards the centre; roots with the bark rather thicker than the porous, yellowish wood; the bark with numerous narrow bast rays, and small resin ducts, in radiating lines; aromatic, sweetish, pungent, and bitter.

Fig. 32.



Levisticum.—Transverse section, magnified 3 diam.

Constituents.—Volatile oil, bitter extractive, resins, sugar, starch, mucilage.

Properties.—Carminative, stimulant, diuretic, emmenagogue. *Dose*, 0.6 to 2 grams (gr. x–ʒss), in infusion.

LASERPITIUM.—White Gentian.

Radix gentianæ albæ.

Origin.—Laserpitium latifolium, *Linné*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Central Europe.

Description.—Several-headed, somewhat conical, annulate above, branched below, and deeply wrinkled; the brown, corky layer removed; grayish-white; fracture short, white; bark thick, with numerous orange-colored resin ducts; wood finely porous; aromatic, bitter.

Constituents.—Volatile oil, bitter principle, mucilage, starch.

Properties.—Tonic, stimulant. *Dose*, 1 to 4 grams (gr. xv–ʒj).

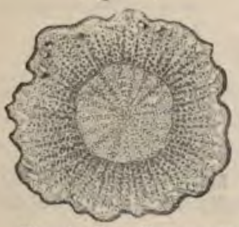
PIMPINELLA.—PIMPERNEL.

Origin.—Pimpinella Saxifraga, *Linné*, and P. magna, *Linné*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Central Europe, in dry and mountainous localities.

Description.—Several-headed, branches of the head short, terminated by the hollow stem-base; fusiform, about 20 centimeters (8 inches) long, annulate above, longitudinally wrinkled and tuberculate below; yellowish-brown or brown-yellow; fracture short, internally whitish; bark thick, radiate, with yellow resin ducts; wood yellowish, porous, radiate; aromatic, sweetish, pungent.

Fig. 33.



Pimpinella.—Transverse section, magnified 3 diam.

Constituents.—Volatile oil, acrid resin, sugar, starch.

Properties.—Stimulant, tonic, sialagogue. *Dose*, 0.5 to 2 grams (gr. viij–ʒss).

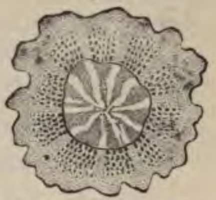
PETROSELINUM.—PARSLEY.

Origin.—Petroselinum sativum, *Hoffmann*, s. Apium Petroselinum, *Linné*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Southern Europe; extensively cultivated.

Description.—Somewhat conical, about 15 centimeters (6 inches) long, and about 12 millimeters (½ inch) thick; light brown-yellow; annulate above, wrinkled below, with transverse ridges; fracture short; bark thick, and, like the medullary rays, white and resinous dotted; wood light yellow, porous; faintly aromatic, sweetish.

Fig. 34.



Petroselinum.—Transverse section, magnified 3 diam.

Constituents.—Volatile oil, mucilage, sugar, starch, apiin (tasteless).

Properties.—Carminative, diuretic, nephritic, discutient. *Dose*, 2 to 4 grams (ʒss–j), in infusion.

SUMBUL.—Sumbul.

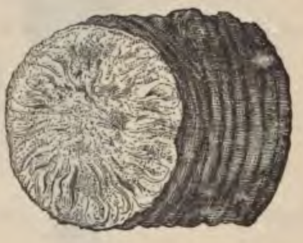
Origin.—Ferula (Euryangium, *Kauffmann*) Sumbul, *Hooker filius*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Central and northeastern Asia.

Description.—In transverse segments varying considerably in diameter and thickness, light, spongy, annulate or longitudinally wrinkled; fracture irregularly fibrous; brown, internally whitish and brown-yellow; odor strong, musk-like; taste bitter and balsamic.

Structure.—Bark thin, with fibre circles; wood fibres irregularly twisted; resin ducts numerous in the spongy white parenchyme.

Fig. 35.



Sumbul section.

False Sumbul of India. Ammoniacum root, sometimes flavored with sumbul; firmer, denser, and of a yellow or reddish tint.

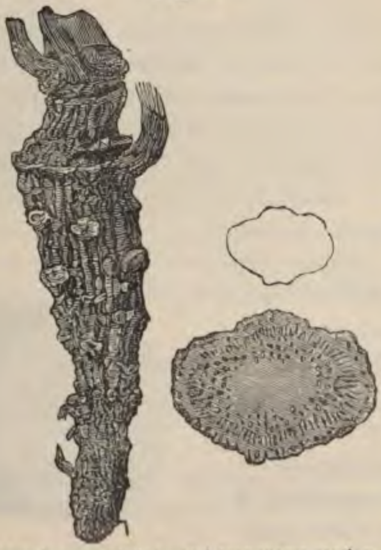
Constituents.—Volatile oil, $\frac{1}{3}$ per cent., bluish; soft resin, 9 per cent., of musk odor; angelic acid, valerianic acid, bitter extractive, sugar, starch; on dry distillation yields umbelliferon.

Properties.—Stimulant, tonic, nervine. *Dose,* 0.5 to 2 grams (gr. viij to ʒss) in powder, tincture, or fluid extract.

IMPERATORIA.—MASTERWORT.

Origin.—Imperatoria Ostruthium, *Linné.* *Natural order,* Umbelliferæ, Orthospermæ.

Fig 36.



Imperatoria root, natural size; and transverse section, magnified.

Habitat.—Southern and Central Europe.

Description.—Somewhat conical, about 5 centimeters (2 inches) long, and nearly 2 centimeters (⅘ inch) thick, flattish, finely annulate above, wrinkled and tuberculate; brown-gray, internally whitish, with numerous resin dots; bark thin, wood-bundles small, inclosing a large pith, odor balsamic; taste pungent and bitter.

Constituents.—Volatile oil ¾ per cent., imperatorin (peucedanin; crystalline, pungently acrid, insoluble in water).

Properties.—Stimulant, tonic. *Dose,* 1 to 2 grams (gr. xv–xxx).

PANAX.—GINSENG.

Origin.—Aralia quinquefolia, *Gray,* s. Panax quinquefolium, *Linné.* *Natural order,* Araliaceæ.

Habitat.—North America, south to the mountains of Georgia and Tennessee; in rich woods.

Description.—Fusiform, 50 to 75 millimeters (2 to 3 inches) long, annulate above, divided below into 2 or 3 equal branches, wrinkled longitudinally; externally, pale brownish-yellow; fracture short, mealy, white, with a thick bark containing numerous reddish resin cells; wood-wedges narrow, yellowish; medullary rays broad; sweetish, slightly aromatic.

Constituents.—Panaquilon, sweet, amorphous, soluble in water and alcohol, insoluble in sodium sulphate solution, precipitated by tannin; resin, mucilage, starch.

Properties.—Demulcent, slightly stimulant. *Dose,* 1 to 8 grams (gr. xv–ʒij).

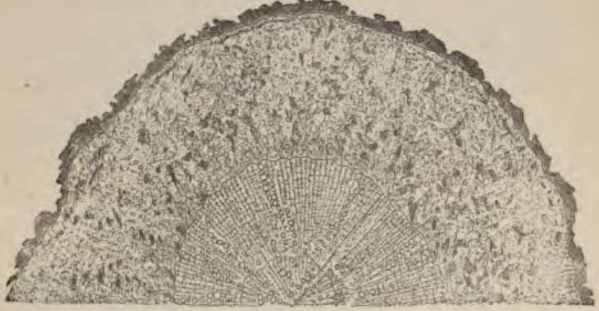
STILLINGIA.—STILLINGIA, QUEEN'S DELIGHT.

Origin.—Stillingia sylvatica, *Linné.* *Natural order,* Euphorbiaceæ.

Habitat.—Southern United States, in sandy soil.

Description.—Subcylindrical, about 30 centimeters (12 inches) long, nearly 5 centimeters (2 inches) thick, tapering, little branched, compact, wrinkled, brown-gray, tough, fracture fibrous; internally pinkish, with yellowish-brown dots; odor peculiar, unpleasant; taste bitter, acrid, pungent.

Fig. 37.



Stillingia, magnified 10 diam.

Structure.—Bark thick, covered with a thin cork, and containing numerous resin cells; the meditullium porous, and with numerous narrow wedges of wood and medullary rays, the latter containing resin cells.

Constituents.—Pungent resin, fixed oil, starch.

Properties.—Alterative, antivenereal, in large doses emetic. *Dose*, 1 to 2 grams (gr. xv–ʒss).

IPOMŒA PANDURATA.—WILD JALAP, MANROOT.

Origin.—Ipomœa pandurata, *Meyer.* *Natural order*, Convolvulaceæ.

Habitat.—United States, in sandy fields.

Description.—Large, conical, about 5 centimeters (2 inches) thick, above with several rhizomes about 1 centimeter ($\frac{2}{5}$ inch) thick; in longitudinal or transverse slices, with overlapping bark, wrinkled and brownish-gray externally, whitish internally; bark thin, with a zone of resin cells, wood-wedges numerous and narrow, in the medullary rays scattered resin cells; odor slight; taste sweetish, bitter, somewhat acrid.

Constituents.—Resin 1–2 per cent., sugar, gum, coloring matter, starch. The resin is a glucoside, soluble in alcohol, ether, chloroform, and alkalies, the latter solution being precipitated by acids.

Properties.—Diuretic, cathartic. *Dose*, 1 to 4 grams (gr. xv–ʒj).

ARMORACIA.—HORSERADISH.

Origin.—Cochlearia Armoracia, *Linné*, s. Armoracia rusticana, *Gaertner*. *Natural order*, Cruciferæ. Siliculosæ.

Habitat.—Eastern Europe, cultivated.

Description.—Used only in the fresh state. Heads several, annulate; root cylindrical, 30 centimeters (12 inches) or more long, 12 to 25 millimeters ($\frac{1}{2}$–1 inch) thick; pale yellowish-brown, somewhat scaly and warty; internally white, fracture short; when crushed, of a pungent odor and sharp acrid taste.

Structure.—Bark thickish, covered with a thin cork and containing numerous yellow stone cells in the outer layer; wood-bundles small in narrow wedges; medullary rays broad; the rhizome with a central pith.

Constituents.—Volatile oil 0.05 per cent., of same composition as oil of mustard, resin, sugar, starch, etc., and about 80 per cent. of water.

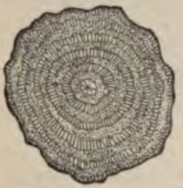
Properties.—Stimulant, irritating, rubefacient.

PHYTOLACCÆ RADIX.—Pokeroot.

Origin.—Phytolacca decandra, *Linné. Natural order*, Phytolaccaceæ.

Habitat.—North America, in waste places; naturalized in Southern Europe and the West Indies.

Fig. 38.



Phytolacca.—Transverse section, natural size.

Description.—Large, conical, somewhat branched, mostly in transverse or longitudinal slices, wrinkled, brown-gray; internally whitish, hard; fracture fibrous; inodorous; sweetish, acrid.

Structure.—Bark thin, with a thin suberous coat; wood-bundles numerous, small, arranged in rays and concentric circles, and surrounded by thin-walled parenchyme.

Constituents.—Resin, starch, tannin, mucilage, possibly alkaloid, ash 10–11 per cent.

Properties.—Alterative, anodyne, resolvent, emetic. *Dose*, 0.3 to 2 grams (gr. v–ʒss) in powder, decoction, or extract.

BRYONIA.—Bryony.

Origin.—Bryonia alba and B. dioica, *Linné. Natural order*, Cucurbitaceæ.

Habitat.—Central and Southern Europe.

Description.—Root conical, about 50 centimeters (20 inches) long, and 5 to 10 centimeters (2–4 inches) thick; usually in disks; externally wrinkled, brownish, from the first species with warts and transverse ridges; fracture short; internally white or grayish, rugged; inodorous; disagreeably bitter.

Structure.—Bark thin with a thin friable cork; wood-bundles numerous, small, arranged in rays and concentric circles, and surrounded by thin-walled parenchyme.

Constituents.—Bryonin (bitter glucoside, soluble in water and alcohol, precipitated by tannin), starch, gum, sugar, etc.

Properties.—Emmenagogue, hydragogue cathartic. *Dose*, 0.6 to 4 grams (gr. x–ʒj).

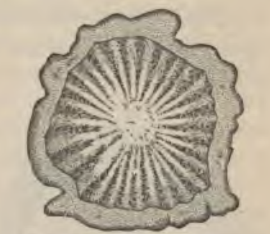
BELLADONNÆ RADIX.—Belladonna Root.

Origin.—Atropa Belladonna, *Linné*. *Natural order*, Solanaceæ.

Habitat.—Central and Southern Europe, in woods.

Description.—In cylindrical, somewhat tapering, longitudinally wrinkled pieces, 12 to 25 millimeters (½ to 1 inch) or more thick, externally brownish-gray, internally whitish, nearly inodorous, of a sweetish afterwards bitterish and strongly acrid taste, and breaking with a nearly smooth and mealy fracture.

Fig. 39.



Belladonna.—Transverse section, magnified 3 diam.

Roots which are tough, woody, and break with a splintery fracture, should be rejected.

Structure.—Bark thickish; wood-bundles yellowish, near the centre small and distant, surrounded by broader wood-wedges and equally wide medullary rays. The wood predominates in old roots.

Constituents.—Atropine 0.2–0.6 per cent., belladonine (probably oxyatropine, $C_{17}H_{23}NO_4$), little hyoscyamine, starch. Atropine, $C_{17}H_{23}NO_3$, is white, crystalline, soluble in ether, chloroform, alcohol, also in water; with alkalies yields tropic acid and tropine; its gold precipitate is crystallizable.

Atropine is found chiefly in the bark; hence woody roots should be rejected; it is present in largest quantity about the time of flowering.

Properties.—Diuretic, dilating the pupil, sedative, narcotic. *Dose*, 0.06 gram (gr. j); of atropine, 1 milligram ($\frac{1}{64}$ grain).

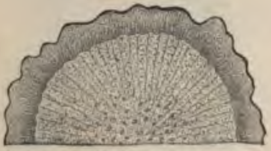
ALTHÆA.—MARSHMALLOW.

Origin.—Althæa officinalis, *Linné.* *Natural order*, Malvaceæ.

Habitat.—Europe; naturalized in the eastern United States, in salt marshes; cultivated in Europe.

Description.—Deprived of the brown corky layer; cylindrical or conical, longitudinally wrinkled pieces, from 7 to 15 centimeters (3 to 6 inches) long, and above 1 centimeter ($\frac{2}{5}$ inch) in diameter; externally white, mealy, somewhat hairy from detached slender bast fibres, and marked with circular scars of the rootlets; fracture short and granular, whitish and fleshy or mealy. Odor faint, peculiar; taste sweetish, mucilaginous.

Fig. 40.



Althæa.—Transverse section, magnified 2 diam.

Marshmallow should not be coated with lime.

Young uncoated belladonna root resembles marshmallow; but is externally not fibrous, and has yellowish wood-wedges.

Structure.—Bark thickish; inner bark radiating from small groups of long bast fibres; meditullium in outer layer faintly radiating; wood-bundles distant and small; medullary rays narrow; the parenchyme filled with starch and containing scattered crystal cells and larger mucilage cells.

Constituents.—Asparagin, mucilage, sugar, starch.

Properties.—Demulcent. *Dose*, 2 to 8 grams (ʒss–ij) in infusion or syrup.

RUBIA.—Madder.

Origin.—Rubia tinctorum, *Linné*. *Natural order*, Rubiaceæ, Stellatæ.

Habitat.—Levant and Southern Europe.

Description.—Rhizome cylindrical, long, about 5 millimeters ($\frac{1}{5}$ inch) thick with distant nodes; roots about 3 millimeters ($\frac{1}{8}$ inch) thick, dark red, deeply wrinkled, with a foliaceous cork, thin brown-red inner bark, spongy red wood, and irregular medullary rays, the rhizome with a dark-red small pith; fracture short, odor feeble; taste sweetish and slightly bitter, acrid, and astringent. Mostly kept in form of powder.

Constituents.—Rubian (yellow, bitter), rubihydran (gum-like), ruberythrin (yellow needles, blood-red with alkalies), alizarin (orange-red needles, purple or blue with alkalies), purpurin (red needles, violet colored with alkalies), pectin, sugar, tannin, etc.

Properties.—Tonic, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj).

ALKANNA.—ALKANET.

Origin.—Alkanna (Anchusa, *Linné*) tinctoria, *Tausch. Natural order*, Boraginaceæ.

Habitat.—Western Asia and southeastern Europe.

Description.—Fusiform, about 10 centimeters (4 inches) long, and 1 centimeter (⅖ inch) thick, with a crown of feltlike leaf bases; deeply wrinkled; bark dark purple, foliaceous, friable, easily separated from the twisted yellowish wood, which is cleft by purple friable medullary rays; nearly inodorous and tasteless; does not tinge the water red.

Constituents.—Alkannin, little starch. Alkannin is of resinous appearance, dark purplish-red, soluble in ether, alcohol, fats, and certain volatile oils, with a red color; in alkalies blue.

Uses.—For coloring tinctures and pomades.

HEUCHERA.—ALUM ROOT.

Origin.—Heuchera americana *Linné*. *Natural order*, Saxifragaceæ.

Habitat.—United States, in woodlands.

Description.—About 15 centimeters (6 inches) long, and 12 millimeters (½ inch) thick, several-headed, somewhat contorted, branched, wrinkled, tuberculate, purplish-brown, fracture short and granular; internally reddish or brownish; bark thin or thickish; meditullium rather spongy; inodorous; very astringent, somewhat bitter.

Constituents.—18 to 20 per cent. of tannin.

Properties.—Astringent. *Dose*, 1 to 2 grams (gr. xv–xxx).

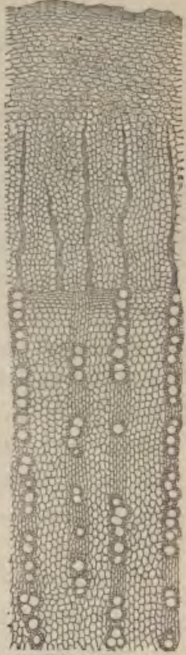
CALUMBA.—COLOMBO.

Origin.—Jateorrhiza Calumba, *Miers*. *Natural order*, Menispermaceæ.

Habitat.—Eastern Africa, cultivated in some East Indian islands.

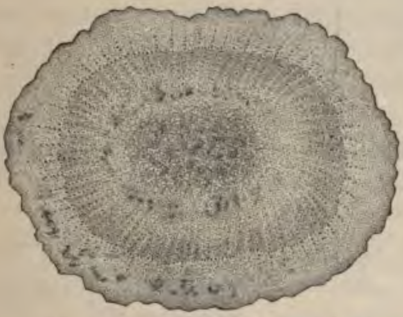
Description.—Nearly circular disks, 3 to 6 centimeters ($1\frac{1}{5}$ to $2\frac{2}{5}$ inches) in diameter, externally brown-gray; internally yellow, and near the cambium gray; depressed in the centre, with two or three interrupted circles of projecting wood-bundles, distinctly radiate in the outer portion; fracture short, mealy; odor slight; taste mucilaginous, slightly aromatic, persistently bitter.

Fig. 42.



Magnified 25 diam.

Fig. 41.



Calumba.—Transverse section, natural size.

Structure.—Bark thickish, with a thin brown cork and narrow bast rays; wood-bundles bright yellow, small, distant near the centre, in narrow rays near the bark; medullary rays broader.

Constituents.—Columbin (white, crystalline, slightly soluble in water), berberine (yellow, crystalline), columbic acid (yellowish, amorphous, nearly insoluble in cold water), starch, mucilage.

Properties.—Tonic. *Dose*, 0.5 to 2 or 4 grams (gr. viij–ʒss–j), in infusion, tincture, extract.

RUMEX.—Yellow Dock.

Radix lapathi.

Origin.—Rumex crispus, *Linné*, and other species of Rumex. *Natural order*, Polygonaceæ.

Habitat.—Europe, naturalized in North America; in grassy places and along roadsides.

Description.—Fusiform, 10 to 20 centimeters (4 to 8 inches) long, 1 to 2 centimeters ($\frac{2}{5}$ to $\frac{4}{5}$ inch) thick, annulate above, deeply longitudinally wrinkled below; externally brown or reddish-brown, internally dingy brownish-yellow; fracture short, nearly inodorous, taste bitter and astringent; on mastication the saliva is tinged yellowish.

Structure.—Bark thickish, with a thin cork and distinct bast wedges; cambium circle prominent; wood-wedges porous, somewhat horny; medullary rays narrow, reddish.

Constituents.—Tannin, mucilage, starch, chrysophanic acid (rumicin, lapathin), calcium oxalate.

Properties.—Astringent, tonic, alterative, in larger doses laxative. *Dose*, 1 to 4 grams (gr. xv–ʒj).

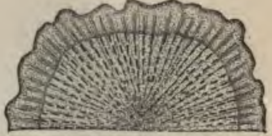
RHAPONTICUM.—RHAPONTIC ROOT. CRIMEAN RHUBARB.

Origin.—Rheum rhaponticum, *Linné*. *Natural order*, Polygonaceæ.

Habitat.—Western Asia, cultivated in some parts of Europe, and in North America (pie plant).

Description.—Fusiform, about 10 centimeters (4 inches) long, and 2 centimeters (⅘ inch) thick, somewhat annulate above, deeply wrinkled; partly deprived of the orange-red cork; fracture short, internally whitish, with narrow straight interrupted red medullary rays, and a rather thick bark; odor and taste resembling rhubarb, more mucilaginous, and less gritty; the saliva, on mastication, tinged yellow.

Fig. 43.



Rhaponticum.—Transverse section, magnified 3 diam.

Constituents.—Like rhubarb, but astringency predominating.

Properties.—Astringent, laxative. *Dose*, 1 to 3 grams (gr. xv–xlv).

RHEUM.—RHUBARB.

Origin.—Rheum officinale, *Baillon*, and probably other species of Rheum. *Natural order*, Polygonaceæ.

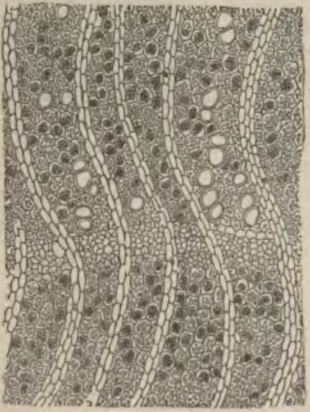
Habitat.—Western and Central China.

Description.—Cylindrical, conical, or flattish segments of the rhizome deprived of the dark-brown corky layer, smoothish or somewhat wrinkled, externally marked with white, elongated meshes, containing a white, rather spongy tissue, and a number of short, red-brown or brown-yellow striæ; compact, hard, fracture uneven;

internally white, marbled with yellow and red; odor peculiar, aromatic; taste bitter, somewhat astringent; gritty when masticated; the saliva is tinged orange-yellow.

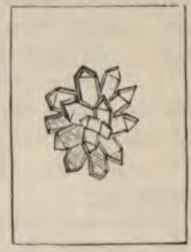
Structure.—The predominating tissue is thin-walled parenchyme containing starch or crystal groups of calcium oxalate. The narrow medullary rays contain orange-red coloring matter, are parallel only near the cambium, and in the interior are irregularly curved and interrupted. The fibro-vascular bundles are soft and porous. Near the cambium line are a few stellate spots, or sometimes a larger number arranged in a loose circle; they indicate the internal origin of the leaves, and contain short, red, somewhat wavy medullary rays radiating from a common centre.

Fig. 44.



Rhubarb.—Section near the cambium, magnified 40 diam.

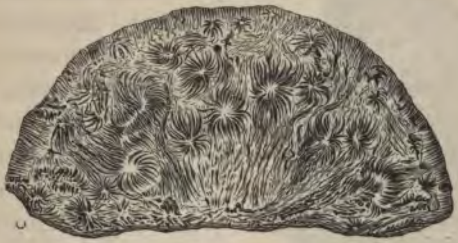
Fig. 45.



Oxalate of calcium crystals in rhubarb.

Varieties.—1. *Russian Rhubarb* came from Chinese Tartary by way of Siberia (Kiachta) to St. Petersburg, and consisted of carefully selected pieces, which after drying were trimmed to beneath the cambium line, and marked with a conical hole, penetrating beyond the middle. It is no longer an article of commerce.

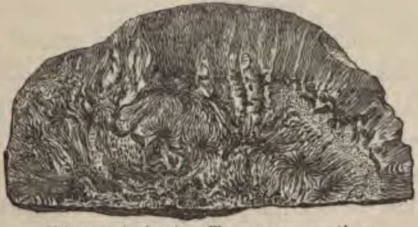
Fig. 46.



Russian rhubarb.—Transverse section.

2. *Chinese Rhubarb*, also called *East India Rhubarb*, is exported from Canton and other Chinese ports, frequently by way of India. The inner bark is always present, small patches of the rough corky layer are occasionally adhering, and fragments of twine on which the

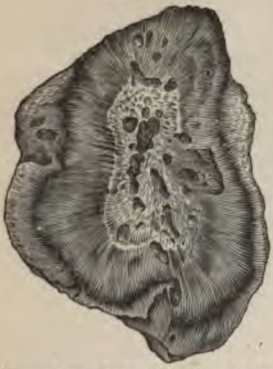
Fig. 47.



Chinese rhubarb.—Transverse section.

root was dried are not unfrequently observed. Its color is less bright, and its odor somewhat less aromatic than that of Russian rhubarb. This variety is the officinal rhubarb.

Fig. 48.



European rhubarb.—Transverse section.

3. *European Rhubarb.* From Rheum palmatum, rhaponticum, compactum, undulatum, Emodi, and other species, culivated in Moravia (Austria), England, and France. Frequently trimmed so as to resemble Chinese rhubarb, but the surface entirely or nearly destitute of white meshes, and the medullary rays interrupted and nearly parallel. The color is paler, the odor weaker, and the taste more mucilaginous and less gritty than in Chinese rhubarb. It is sometimes used in veterinary practice.

Constituents.—Chrysophan, chrysophanic acid, erythroretin, emodin, phæoretin, aporetin, starch, tannin, crystals of calcium oxalate; the first-named principles yield with alkalies a deep-red or brown-red color. *Chrysophan*, $C_{27}H_{30}O_{14}$, is orange-yellow, bitter, soluble in alcohol and water, yields with dilute acids sugar and *chrysophanic acid*, $C_{15}H_{10}O_4$; this is nearly tasteless, bright yellow, crystalline, freely soluble in benzol, chloroform, volatile and fixed oils, less soluble in alcohol and ether, nearly insoluble in cold water. *Erythroretin* is yellow, tasteless, readily soluble in alcohol, less so in ether. *Emodin*, is orange-colored, insoluble in benzol.

Phæoretin is yellowish-brown, soluble in alcohol, insoluble in ether, chloroform, and water. *Aporetin* is blackish, resinous, sparingly soluble in simple solvents. *Rheotannic acid*, $C_{26}H_{26}O_{14}$, is yellowish, soluble in water and alcohol, and yields with dilute acids sugar and *rheumic acid*, $C_{20}H_{16}O_{9}$, which is sparingly soluble in cold water.

Properties.—Tonic, astringent, aperient, purgative. *Dose*, 0.3 to 1.6 grams (gr. v–xxv).

GLYCYRRHIZA.—LICORICE ROOT.

Radix liquiritiæ.—Liquorice Root.

Origin.—Glycyrrhiza glabra, *Linné*. *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—Southern Europe, cultivated.

Description.—Long cylindrical pieces, from 5 to 25 millimeters ($\frac{1}{5}$ to 1 inch) thick, longitudinally wrinkled, externally grayish-brown, warty; internally tawny-yellow; pliable, tough; fracture coarsely fibrous; nearly inodorous; taste sweet, somewhat acrid.

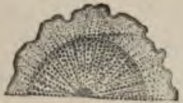
The under-ground stem, which is often present, has the same appearance, but contains a thin pith.

Structure.—Bark rather thick, with a thin cork and narrow bast wedges, the latter containing tough bast-fibres and cells with crystals of calcium oxalate. Wood-wedges narrow, appearing porous from small groups of large ducts, and accompanied by crystal cells. Medullary rays distinct, consisting of several rows of cells, and containing starch.

Varieties.—1. *Spanish, Italian, and Turkish licorice root.* The kind described, exported from the countries named.

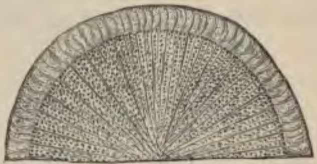
2. *Russian licorice root.* From Glycyrrhiza glandulifera, *Waldstein et Kitaibel* (a variety of Gl. glabra). It is mostly thicker than the preceding, is deprived of the corky layer, externally bright tawny-yellow, smooth, the wood-wedges softer and paler, the cells larger, and the tissue often cleft.

Fig. 49.



Glycyrrhiza glabra (rhizome).

Fig. 50.



Glycyrrhiza glandulifera (root).

Constituents.—Glycyrrhizin about 6 per cent. (probably in combination with ammonia), glycyramarin, sugar, asparagin, starch, resin. Glycyrrhizin, $C_{24}H_{36}O_9$, is a glucoside, splitting into glucose and bitter glycyrretin.

Properties.—Demulcent, expectorant. *Dose,* 1 to 4 grams (gr. xv–ʒj).

HEMIDESMUS.—INDIAN SARSAPARILLA.

Origin.—Hemidesmus indicus, *R. Brown. Natural order*, Asclepiadaceæ.

Habitat.—East Indies.

Description.—Cylindrical pieces, about 15 centimeters (6 inches) long, and 12 millimeters (½ inch) thick, tortuous, wrinkled, and fissured, dark-brown, hard; internally whitish and mealy; odor tonka-like; taste sweetish and slightly acrid. The stems are nearly inodorous and tasteless.

Structure.—Bark thin, with a thin cork and small scattered laticiferous ducts. Medullary rays narrow, indistinct.

Constituents.—Stearopten, starch, etc.

Properties.—Diaphoretic, diuretic, alterative, tonic. *Dose*, 2 to 4 grams (ʒss–j).

ABRI RADIX.—Indian Licorice.

Origin.—Abrus precatorius, *Linné.* *Natural order*, Leguminosæ, Papilionaceæ.

Habitat. — India; naturalized in most tropical countries.

Description.—Cylindrical, somewhat twisted pieces, 6 to 25 millimeters (¼–1 inch) thick; externally light reddish-brown; fracture short, fibrous; internally yellowish; bark quite thin; meditullium composed of alternating layers of porous wood and parenchyme, traversed by medullary rays varying in width; odor slight; taste bitterish, afterward sweetish.

Constituents.—Glycyrrhizin (?), sugar, etc.

Properties.—Demulcent, emollient.

HYDRANGEA.—Hydrangea.

Origin.—Hydrangea arborescens, *Linné.* *Natural order*, Saxifragaceæ, Hydrangeæ.

Habitat.—United States; on rocky banks.

Description.—Head irregular, knotty; roots of variable length and thickness, bent and branched; externally pale-gray, with light rust-colored patches; tough; fracture splintery; internally white; bark thin, readily separated from the wood, the latter with numerous narrow or linear wood-wedges and medullary rays; inodorous; taste sweetish, somewhat pungent, the wood nearly tasteless.

Constituents.—Resin, gum, sugar, starch, etc.

Properties.—Diuretic, lithontryptic. *Dose*, 2 to 4 grams (ʒss–j).

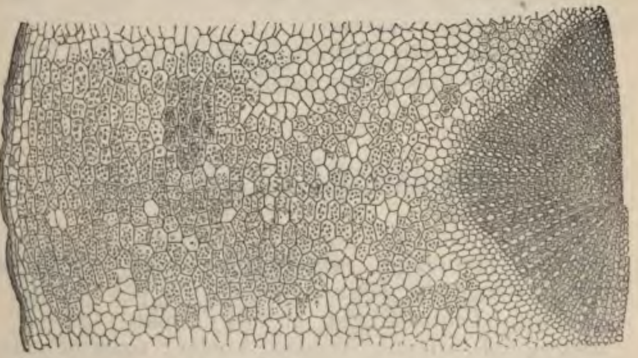
IPECACUANHA.—IPECACUANHA.

Origin.—Cephaëlis Ipecacuanha, *A. Richard.* *Natural order*, Rubiaceæ, Coffeæ.

Habitat.—Brazil to Bolivia and New Granada, in damp forests.

Description.—About ten centimeters (4 inches) long and 4 millimeters ($\frac{1}{6}$ inch) thick; mostly simple, contorted, dull gray-brown or blackish, finely wrinkled, closely irregularly annulated, and often transversely fissured; internally scarcely radiate; bark brittle, brownish, somewhat waxy, easily separated from the thin,

Fig. 51.



Ipecacuanha.—Transverse section, magnified 65 diam.

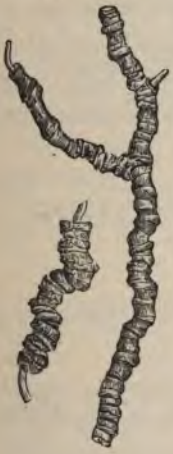
whitish, tough, ligneous portion; odor slight, nauseous; taste bitterish, acrid, nauseating.

Structure.—Cork thin. Bark not uniform in thickness, not radiating, consists of parenchyme inclosing starch. Meditullium slightly radiating, consists of pitted wood cells containing starch.

Varieties.—According to the tint of the corky layer, *gray*, *red*, and *black* ipecac, all being derived from the same species. Ipecacuanha from Carthagena is less conspicuously annulate, has a more firmly adhering bark, and the medullary rays of the wood are more distinct; it comes from Cephaëlis acuminata, *Karsten.*

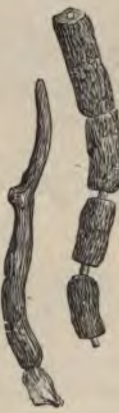
Substitutions.—The following are used in Brazil, besides other roots, like ipecacuanha, and are occasionally met with in Europe, but rarely seen in the United States:

Fig. 52.



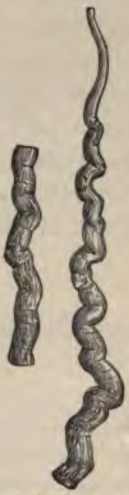
Ipecacuanha.

Fig. 53.



Striated ipecacuanha.

Fig. 54.



Undulated ipecacuanha.

Striated ipecacuanha. From Psychotria emetica, *Linné. Natural order*, Rubiaceæ. Longitudinally wrinkled, with distant transverse fissures; dark purplish-brown; bark thick.

Undulated ipecacuanha. From Richardsonia scabra, *Saint Hilaire. Natural order*, Rubiaceæ. Undulate, slightly wrinkled, annulate and transversely fissured, gray; bark mealy; wood nearly the thickness of the bark.

White ipecacuanha. From Ionidium Ipecacuanha, *Ventenat. Natural order*, Violaceæ. Somewhat branched, not annulate, longitudinally wrinkled, whitish or pale brownish-yellow; wood porous, rather thick, yellowish.

Constituents.—Emetine about 1 per cent., ipecacuanhic acid (amorphous bitter glucoside), resin, pectin, starch, sugar. Emetine, $C_{28}H_{40}N_2O_5$, is a white powder, soluble in alcohol and chloroform, slightly soluble in cold water, ether, and fixed oils; colored bright yellow or orange by solution of chlorinated lime; its nitrate is nearly insoluble.

Properties.—Expectorant, nauseant, emetic. *Dose*, 0.06, 0.3, to 1 or 2 grams (gr. j, gr. v, gr. xv–xxx).

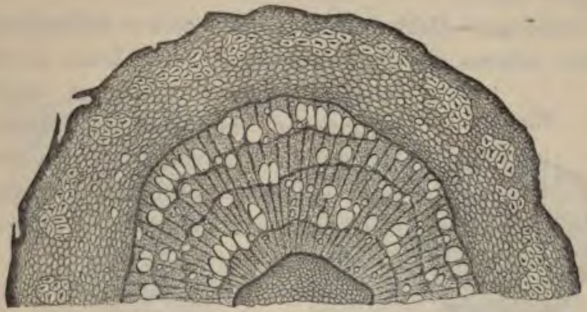
APOCYNUM ANDROSÆMIFOLIUM.—DOG'S BANE.

Origin.—Apocynum androsæmifolium, *Linné. Natural order*, Apocynaceæ.

Habitat.—North America, chiefly northward.

Description.—Long cylindrical, branched, about 6 millimeters (¼ inch) or less thick; bark pale brownish, wrinkled, transversely fissured, thickish; internally white, containing a circle of stone-cell groups, and rather small laticiferous ducts; unpleasantly bitter, easily separable from the tough, white, porous, and tasteless wood, which has narrow medullary rays. The rhizome has a central pith.

Fig. 55.



Apocynum androsæmifolium.—Transverse section, magnified 25 diam.

It should not be confounded with the root of Apocynum cannabinum, *Linné*, which has a relatively thicker bark and soft, fragile, porous wood.

Constituents.—Bitter principle, resin, caoutchouc, starch, etc.

Properties.—Diuretic, sudorific, emetic, cathartic. *Dose*, 0.3 to 1.6 grams (gr. v–xxv).

GELSEMIUM.—GELSEMIUM. YELLOW JASMINE.

Origin.—Gelsemium sempervirens, *Aiton. Natural order*, Loganiaceæ.

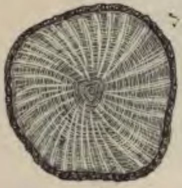
Habitat.—Southern United States.

Description.—The creeping rhizome and rootlets are collected. Cylindrical, long or cut in sections, occasionally 3 centimeters (1¼ inch) thick, the roots often thinner;

externally light brown-yellow with purplish-brown longitudinal lines; tough, fracture splintery; internally yellowish; odor aromatic, heavy; taste bitter, of the wood slightly so.

Structure.—Bark thin, with a thin cork and silky bast fibres, adheres closely to the wood. The latter is yellowish, composed of porous wood-wedges, and has rather broad medullary rays. The rhizome has a thin pith. The parenchyme contains starch and a few crystals of calcium oxalate.

Fig. 56.



Gelsemium.—Transverse section.

Constituents.—Volatile oil, gelsemine, $C_{11}H_{12}NO_2$, gelseminic acid (regarded by some as being identical with æsculin), resin, starch; gelsemine is amorphous, soluble in ether, chloroform, and alcohol, slightly soluble in water.

Properties.—Nervine, antispasmodic, sedative. *Dose,* 0.2 to 0.6 gram (gr. iij–x) in powder, tincture, or fluid extract.

PAREIRA.—PAREIRA BRAVA.

Origin.—Chondodendron tomentosum, *Ruiz et Pavon.* *Natural order*, Menispermaceæ.

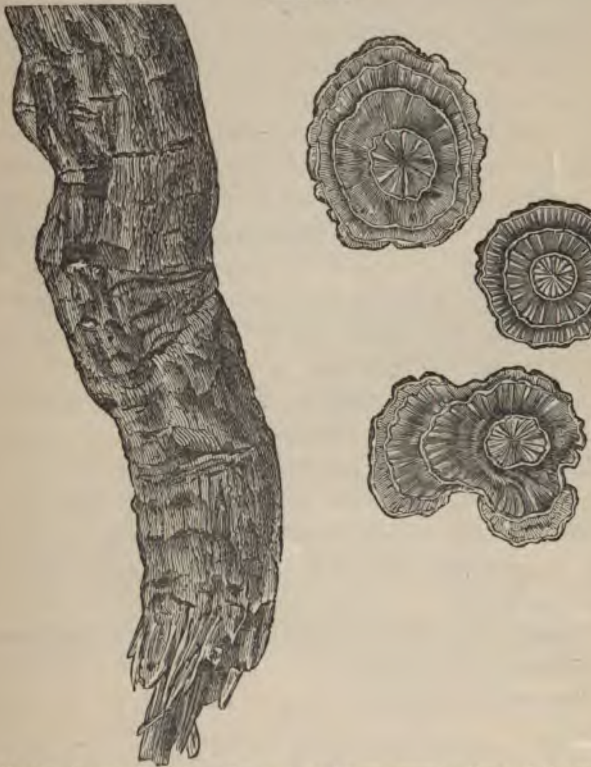
Habitat.—Brazil.

Description.—Subcylindrical, somewhat tortuous pieces, about 10 to 15 centimeters (4 to 6 inches) long, varying in thickness between 2 and 10 centimeters ($\frac{3}{4}$ and 4 inches); externally dark brown-gray, with transverse ridges and fissures and longitudinal furrows; internally pale brown, porous; the fresh cut of a waxy lustre; inodorous, bitter.

Pieces having a bright yellow color, or with a grayish, hard, nearly tasteless wood, should be rejected.

Structure.—Bark thin, with a thin cork. Wood in two or more somewhat irregularly concentric circles, which are separated by layers, composed of parenchyme,

Fig. 57.



Pareira brava.—Portion of a root, and transverse sections of the same.

stone cells, and compressed cells; the central circle occupied by about 12 wood-wedges, containing large ducts, separated by somewhat narrower medullary rays, and terminating by a semicircular line of compressed cells; the subsequent circles have the same structure, but a larger number of wood-wedges and medullary rays.

Admixtures and Substitutions.—Pareira brava is not unfrequently mixed with sections of the *stem*, which has a rather thicker bark, when young, dotted with black warts, nearly regular zones of wood-wedges, and a central pith; taste bitterish; otherwise resembles the root.

False Pareira brava.—*a.* Wood hard, very excentric, in separate circles and sections of circles, grayish, the fresh cut not waxy; bark thin, slightly bitter. Origin unknown.

b. Wood hard, pale brown, nearly concentric, separate circles; bark thin, nearly tasteless; otherwise resembling the preceding. Origin unknown.

c. Bark blackish; wood whitish, amylaceous, tasteless; derived from Abuta rufescens, *Aublet.*

d. Wood hard, very excentric, in separate circles and sections of circles, bright yellow like the thin bark; bitter. It contains berberine or a closely allied alkaloid, and is probably derived from Abuta amara, *Aublet.* Habitat, Brazil.

Constituents.—Pelosine, about 0.5 per cent., identical with beberine and buxine.

Properties.—Diuretic, tonic. *Dose*, 2 to 4 grams (ʒss–j).

BERBERIS.—BARBERRY.

Radix berberidis.

Origin.—Berberis vulgaris, *Linné.* *Natural order*, Berberidaceæ.

Habitat.—Europe and Western Asia; naturalized in North America.

Description.—Much branched, sometimes 5 centimeters (2 inches) thick, hard and tough, brownish, internally yellow, with a rather thin, foliaceous bark, and thick, light yellow wood; inodorous, bitter.

Constituents.—Berberine (see Hydrastis), vinetine (berbine or oxyacanthine; see Barberry bark).

Properties.—Tonic. *Dose*, 2 to 4 grams (ʒss–j) in decoction, etc.

BAPTISIA.—Wild Indigo.

Origin.—Baptisia tinctoria *Robert Brown. Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—North America.

Description.—Head short with knotty branches, and with several roots; the latter are bent, little branched, about 50 centimeters (20 inches) long, from 3 to 12 millimeters (⅛–½ inch) thick; externally brown, somewhat warty and scaly; fracture tough and fibrous; internally whitish; bark rather thick with a thin brown cork, and tough bast fibres in radial lines; wood tough, finely porous; medullary rays narrow, indistinct; inodorous; taste of bark bitterish, somewhat acrid and nauseous; wood tasteless.

Constituents.—Baptisine (acrid, soluble in water, alcohol, and ether), resin, starch, etc.

Properties.—Stimulant, emetic, cathartic. *Dose*, 0.3 to 1 gram (gr. v–xv).

STATICE.—Marsh Rosemary.

Origin.—Statice Limonium, *Linné*, var. caroliniana, *Gray*. *Natural order*, Plumbaginaceæ.

Habitat.—North America, near the coast.

Description.—Several-headed, 30 to 60 centimeters

(12 to 24 inches) long, 25 millimeters (1 inch) or more thick, annulate above, branched and wrinkled below, compact, tough, purplish-brown externally, lighter internally, with a rather thick bark and narrow, yellowish wood-wedges; inodorous, strongly astringent, and slightly bitter.

Constituents.—Tannin 14–18 per cent., mucilage, sugar, etc.

Properties.—Astringent. *Dose*, 0.5 to 2 grams (gr. viij–xxx).

CEANOTHUS.—RED ROOT.

Origin.—Ceanothus americanus, *Linné* (New Jersey tea). *Natural order*, Rhamnaceæ.

Habitat.—North America, in dry woodlands.

Description.—Head simple, knotty-tuberculate, and little branched; root about 30 centimeters (12 inches) long, and above 10 to 25 millimeters (2/5–1 inch) thick, contorted, somewhat branched, rust brown, finely wrinkled; fracture granular through the thin rust-colored bark; wood tough, pale brown-red, with fine medullary rays; inodorous; bitter astringent.

Constituents.—Tannin, starch.

Properties.—Astringent, tonic. *Dose*, 0.6 to 2 grams (gr. x–xxx).

KRAMERIA.—RHATANY.

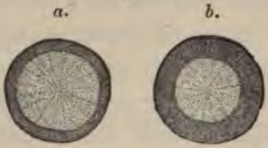
Origin.—1. Krameria triandra, *Ruiz et Pavon*, and, 2. Krameria tomentosa, *Saint Hilaire*. *Natural order*, Krameriaceæ.

Habitat—1. Peru and Bolivia; 2. New Granada.

Description.—About 25 millimeters (1 inch) thick, knotty and several-headed above, branched below, the branches thinner and long; bark smooth or scaly, deep rust-brown, about 2 millimeters (1/12 inch) thick, very astringent, inodorous; wood pale brownish, tough, finely radiate, nearly tasteless; bark of branches about ⅛ or ⅙ the diameter.

The root of Krameria tomentosa (Savanilla rhatany) is less knotty, more slender, and has a dark brownish-purplish, somewhat scaly bark, about 3 millimeters (⅛ inch) thick; bark of branches about ⅕ to ¼ the diameter.

Fig. 58.



Transverse section of—*a.* Peruvian, *b.* Savanilla rhatany root.

Structure.—Cork rather thick; parenchyme of bark dotted, contains starch; bast bundles small, forming interrupted lines; medullary rays broad, in the finely porous wood very narrow.

Varieties.—1. *Peruvian or Payta rhatany*, and, 2. *Savanilla rhatany.* Described above.

3. *Para or Brazilian rhatany.* Probably from Kr. argentea, *Martius.* Resembles Savanilla rhatany; but is more blackish, less of a purple tint, very flexible; bark transversely fissured and somewhat warty.

4. *Texan rhatany.* From Kr. secundiflora, *De Candolle.* Thin; externally blackish-brown, scaly; bark of branches about ⅓ the diameter; not found in commerce.

Constituents.—Kramero-tannic acid about 20 per cent., rhatanic red, starch.

Properties.—Astringent. *Dose,* 0.5 to 2 grams (gr. viij–ʒss), in powder (rarely), syrup, tincture, extract.

2. RHIZOMES.—RHIZOMATA.

Rhizomes are stems remaining wholly or partly under ground, and are mainly distinguished from roots by the presence of scaly leaves or of sheathing leaf-bases or their scars, whereby they, or at least their younger portion, acquire a more or less annulated appearance. Rhizomes grow mostly in a horizontal or oblique direction, and bear on the upper side the scars of overground stems and leaf-sheaths, while the rootlets are mainly on the lower side. Few of the officinal rhizomes have a perpendicular growth, are on all sides uniformly surrounded by rootlets, and on the lower end are more or less truncate. Branches, if present, emanate from the axils of leaf-scars.

Histology.—The rhizomes of cryptogamous plants (ferns) consist of parenchyme, in which a few, more or less laterally elongated, not wedge-shaped, wood-bundles are arranged in a loose circle.

The rhizomes of monocotyledons consist of a circle of parenchyme, followed by a circular row of thick-walled cells, the nucleus sheath or endoderm, and inclosing a cylinder of parenchyme in which wood-bundles are irregularly scattered, and these are often most abundant near the nucleus sheath; in some cases wood-bundles are also observed in the outer layer which may be likened to the bark. The nucleus sheath is sometimes wanting.

The rhizomes of dicotyledons have usually the epidermis replaced by a layer of cork; the bark consists of an outer and an inner layer, the latter being the liber, and is separated by a thin layer of cambium from the wood, which is circularly arranged in more or less distinctly wedge-shaped masses, and these alternate with medullary rays and inclose a circular pith.

Classification.

Sect. 1. Cryptogamous Rhizomes.	
Rhizome densely covered with stipes, and between these with brown silky chaff.	Aspidium.
Sect. 2. Monocotyledonous Rhizomes.	
Collected without rootlets.	
Aromatic and pungent.	
Peeled or unpeeled, flattish, lobed, with numerous oil-cells.	Zingiber.
Usually in disks, light reddish or brown-gray, with oil-cells.	Zedoaria.
Cylindrical, annulate, branched, reddish-brown; internally whitish, with oil-cells.	Galanga.
Globular-pyriform, or more frequently cylindrical, gray; internally orange-yellow, horny.	Curcuma.
Aromatic and bitter, flattish-cylindrical, on the lower side with scars of rootlets in wavy and branched lines.	Calamus.
Odor of violets, bitterish, white, consisting of flattened club-shaped joints.	Iris florentina.
Taste sweet; thin, straw-yellow; internally whitish, spongy, hollow in centre.	Triticum repens.
Taste bitterish, acrid; thin, brown-gray, under the epidermis a circle of large air-tubes.	Carex arenaria.
Taste bitterish; thick, tuberous, tuberculated, reddish-brown; internally whitish-brown dotted.	Smilax China.
Taste acrid, tingling; obconical, brown, surrounded by scars of rootlets; internally whitish, with short curved wood-bundles.	Veratrum album.
Collected with rootlets.	
Taste acrid, tingling; obconical, brown, surrounded by shrivelled, lighter-colored, simple rootlets; internally whitish, with short curved wood-bundles.	Veratrum album and Ver. viride.

Resembling the preceding, but of larger dimensions, dark gray, and, when rubbed, of a disagreeable odor.	Dracontium.
Taste sweetish, astringent, bitter, and acrid; subglobular or obconical; wood-bundles curved.	Trillium.
Taste bitter; short, cylindrical; wood-bundles crowded near centre.	Chamælirium.
Taste amylaceous, bitter; short, cylindrical, jointed.	Aletris.
Taste acrid; brown, consisting of cylindrical joints, which are flattened above.	Iris versicolor.
Taste bitterish, slightly acrid; long, thin, subcylindrical, little branched, brown; on upper side with approximate cup-shaped stem-scars.	Cypripedium.
Long, thin, cylindrical, branched, whitish, with rather distant stem-scars above.	Convallaria.
Resembling the preceding, but thicker and jointed between the stem-scars.	Polygonatum.
Taste acrid; flattish cylindrical, bent and branched; whitish, hard.	Dioscorea.

Sect. 3. Dicotyledonous Rhizomes.

Collected with few or no rootlets.

Short, leaf-scars approximate.

Acrid; cylindrical, deep brown-red; internally white, with numerous red resin-cells.	Sanguinaria.
Astringent; cylindrical, brown; internally reddish; bark thin; wood-wedges small; medullary rays broad.	Geranium.
Astringent; irregularly conical, pitted, brown; internally reddish; bark thick; wood-wedges small; medullary rays broad.	Tormentilla.
Astringent; S-shaped, flattish, red-brown; internally reddish; bark thick; wood-wedges small, numerous; medullary rays narrow.	Bistorta.

Long horizontal, leaf-scars mostly distant.

Mucilaginous, bitter, and astringent; grayish, spongy; wood-bundles scattered; disks or sections.	Nymphæa.

Somewhat bitter and acrid; composed of joints, terminated by a broad cup-shaped scar on upper side, and a tuft of rootlets underneath.	Podophyllum.
Cylindrical, somewhat tuberculate, with laticiferous vessels.	Asclepias cornuti.
Somewhat aromatic, sweetish; cylindrical, annulate above.	Aralia nudicaulis.
Very pungent, cylindrical.	Armoracia (see Roots).
Collected with rootlets.	
Rhizomes short, upright or mostly oblique, often knotty.	
Aromatic, more or less pungent.	
Upright, subglobular, or obconical; internally brownish, waxy, with small wood-wedges.	Valeriana.
Cylindrical, oblique, or horizontal; wood circle narrow; in bark of rhizome and rootlets, near the wood, a circle of resin-cells.	Arnica.
Thin cylindrical, oblique, with projecting stem-scars on upper side and numerous rootlets beneath; wood somewhat excentric.	Serpentaria.
Thin cylindrical, with deeply cup-shaped stem-scars on upper side and numerous rootlets beneath; wood excentric.	Spigelia.
Slightly aromatic, bitter, and astringent.	
Subcylindrical, oblique, with fragile rootlets; wood soft; pith brown-gray.	Geum rivale.
Subcylindrical or obconical, with numerous fragile rootlets; wood rather hard; pith reddish; odor clove-like.	Geum urbanum.
Not aromatic; bitter or somewhat acrid, wood (except in Hydrastis) prominent, hard.	
Subglobular; wood white; rootlets numerous, brittle; pale brown.	Asclepias incarnata.
Obconical or oblique and short-jointed; yellowish-gray; internally bright yellow.	Hydrastis.

Horizontal, short-branched, matted; stem-scars broad; brown; tough.	Caulophyllum.
Very knotty and hard; brown-gray; stem-scars shallow.	Collinsonia.
Irregular tuberculate, blackish-brown, waxy; wood-bundles rather distant; wood of rootlets somewhat hexagonal.	Helleborus niger.
Like preceding, somewhat smaller; wood-bundles approximate in about four distant groups; wood of rootlets with four short rays.	Helleborus viridis.
Like the following, but smaller.	Actæa alba.
Stout branches ascending, black-brown, hard; wood-wedges approximate; wood of rootlets with four long rays.	Cimicifuga.
Stout knotty-cylindrical, gray-brown, hard; scars concave; medullary rays fine.	Triosteum.
Knotty, red-brown; rootlets more or less annulate; resinous dotted in the bark.	Gillenia.
Elongated, mostly not knotty.	
Aromatic; knotty from prominent stem-scars; roots long.	Aralia. racemosa.
Aromatic, pungent; quadrangular or two-edged, thin, gray-brown; bark thick; wood-wedges small; pith large.	Asarum.
Bitter, slightly acrid; flattened, branched, black-brown; bark thin; wood thick, tough; pith brownish.	Leptandra.
Bitter; cylindrical, pale yellowish-brown; internally bright yellow; wood tough; pith small.	Xanthorrhiza.
Bitter; often knotty; yellowish-brown; tough.	Berberis aquifolium.
Aromatic, bitter; cylindrical, light brown; bark thin; wood hard; pith small.	Gelsemium (see Roots).
Sweet; cylindrical, brownish; internally tawny-yellow; bark rather thick; wood large-porous.	Glycyrrhiza (see Roots).
Sweetish, slightly acrid; cylindrical or in powder; deep red.	Rubia (see Roots).

Bitter; cylindrical, yellowish-brown; internally yellowish; woody zone narrow, tough; pith large, somewhat excentric.	Menispermum.

ASPIDIUM.—Aspidium.

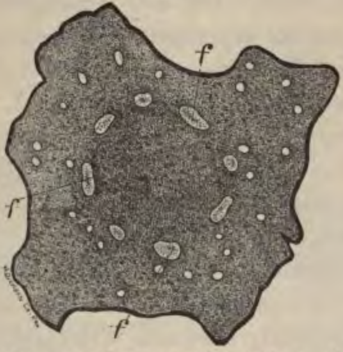
Male fern.

Origin.—1. Aspidum Filix mas, *Swartz*, and, 2. Aspidium marginale, *Willdenow*. *Natural order*, Filices.

Habitat.—1. Canada, Rocky Mountains, Northern Asia, and Europe. 2. United States.

Description.—From 7 to 15 centimeters (3 to 6 inches) long, 15 to 25 millimeters ($\frac{3}{5}$ to 1 inch) thick, and, together with the closely imbricated stipe remnants, 50 or 65 millimeters (2–2½ inches) in diameter, and densely covered with brown, glossy transparent, and soft chaffy scales; externally of a dark brown color; internally pale green, rather spongy; the vascular bundles about 10 (A. Filix mas) or 6 in number (A. marginale), arranged in

Fig. 59.



Filix mas.—Transverse section, magnified 3 diam. *f.* Fibrovascular bundles.

an interrupted circle; odor slight, disagreeable; taste sweetish, bitter, somewhat astringent, nauseous.

When used, the chaff, together with the dead portions of the rhizome and stipes, must be removed, and only such portions as have retained their green color should be employed.

Structure.—The parenchyme is thin-walled, and contains minute starch grains and green oil, and in the intercellular spaces short-stalked oil glands. The vascular bundles consist mostly of scalariform ducts.

Constituents.—Fixed oil 6–7 per cent., filitannic acid, filixred, chlorophyll, and filicic acid, $C_{14}H_{18}O_5$; the latter crystalline, soluble in fixed and volatile oils, less soluble in ether and alcohol, insoluble in water; yields, with fusing potassa, butyric acid and phloroglucin. The constituents named are contained in Oleoresina filicis.

Properties.—Tænifuge. *Dose*, 2 to 8 grams (ʒss–ij), or the oleoresin, 0.3 to 1 gram (gr. v–xv).

Allied drugs.—Aspidium rigidum, *Swartz*, indigenous to Europe and California. The rhizome is longer and thinner than male fern, has the stipes loosely imbricate, and contains 6 vascular bundles.

Aspidium athamanticum, *Kunze*, pauna-pauna, uncomocomo, from Southern Africa; thicker and firmer than male fern; internally brownish, with black resin-dots and broader wood-bundles.

Substitutions.—The rhizomes of most indigenous ferns are thinner, the stipes rarely closely imbricate, and usually free from, or with very little, chaff.

ZINGIBER.—GINGER.

Origin.—Zingiber officinale, *Roscoe.* *Natural order*, Zingiberaceæ.

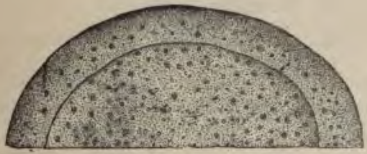
Habitat.—India; cultivated in the tropics.

Description.—Flattish, about 15 millimeters ($\frac{3}{5}$ inch) broad, on one side lobed or clavately branched, deprived of the epidermal layer, pale buff-colored, striate, breaking with a mealy rather fibrous fracture; internally whitish, with numerous small orange-colored dots and a distinct nucleus sheath; agreeable aromatic, of a pungent and warm taste.

Structure.—The tissue consists mainly of parenchyme containing flattened starch granules, and is, in coated ginger, surrounded by a layer of tangentially elongated cells, resembling those of the nucleus sheath. The resin cells are scattered through the tissue, and the fibro-vascular bundles are most numerous within the circle of the nucleus sheath.

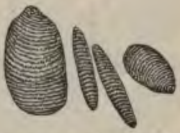
Varieties.—Coated and uncoated ginger: the latter deprived of the epidermal layer; the former sometimes distinguished as *black* ginger—a designation more properly restricted to the rhizome, which, before drying, has been steeped in boiling water, and, when dry, breaks with a horny, blackish, somewhat diaphanous fracture, due to the pasty condition of the starch. The commercial varieties are designated from the country of production.

Fig. 60.



Zingiber—Transverse section, magnified 3 diam.

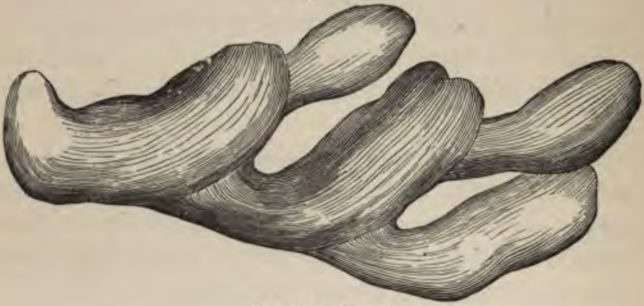
Fig. 61.



Ginger starch-granules. Magnified 250 diam.

1. *Jamaica ginger.* The kind described above; sometimes the rhizome has been steeped in milk of lime, and is covered with a white powder of calcium carbonate.

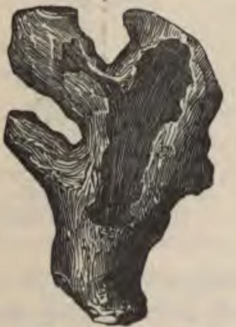
Fig. 62.



Jamaica ginger.

2. *African ginger.* Coated with a light brown or gray-brown tissue, rhizome shorter, the lobes broadly linear or oblong.

Fig. 63.



East India ginger.

3. *Chinese ginger.* Coated, rhizome shorter, the lobes stumpy.

4. *East India ginger.* Coated on the edges, the flat sides deprived of the epidermal layer.

5. *Green ginger.* The lobed branches recently dug and sent to market without drying.

6. *Preserved ginger.* Fresh ginger steeped in hot syrup; it is soft, brown-yellow, translucent.

Constituents.—Volatile oil, 1 to 2 per cent., gingerol (viscid inodorous liquid, to which the hot taste is due), resin, starch, mucilage, etc.

Properties. — Carminative, stimulant, sternutatory, rubefacient, anodyne. *Dose,* 0.3 to 2 grams (gr. v–xxx), in powder or tincture.

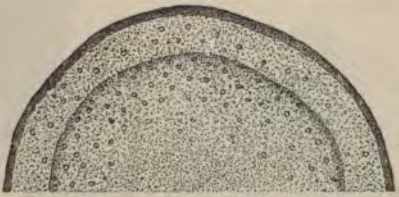
ZEDOARIA.—ZEDOARY.

Origin.—Curcuma Zedoaria, *Roscoe.* *Natural order,* Zingiberaceæ.

Habitat.—India.

Description.—Circular disks of a tuber, 1 to 4 centimeters ($\frac{2}{5}$ to $1\frac{3}{5}$ inch) in diameter, orange-brown; internally pale reddish-gray brown, with numerous brown-yellow resin cells, and lighter colored wood-bundles, the latter most numerous within the nucleus sheath, which separates the central portion from a much thinner outer layer; fracture short, somewhat mealy, and slightly horny; odor and taste ginger-like.

Fig. 64.



Zedoaria.—Transverse section, magnified 3 diam.

Constituents.—Volatile oil, resin (to which the pungent taste is due), starch, mucilage, etc.

Properties and Dose.—Like ginger.

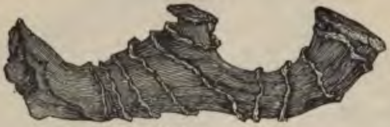
GALANGA.—GALANGAL.

Origin.—Alpinia officinarum, *Hance.* *Natural order,* Zingiberaceæ.

Habitat.—China.

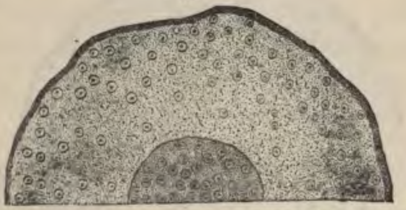
Description.—Cylindrical, branched, about 5 centimeters (2 inches) and 15 millimeters (⅜ inch) thick, annulate by distant leaf-sheaths, rust-brown; fracture short, somewhat fibrous; internally brownish-white, with numerous brown-yellow resin cells and brownish wood-bundles, which are scattered in the outer layer and approximate in the equally thick central portion; odor and taste ginger-like.

Fig. 65.



Galanga.

Fig. 66.



Galanga.—Transverse section, magnified 3 diam.

The *larger galangal* from Alpinia Galanga, *Swartz* (India), which is of larger dimensions and of a more red color, is now not an article of commerce.

Constituents.—Volatile oil, resin (to which the pungent taste is due), starch, mucilage, etc.

Properties and Dose.—Like ginger.

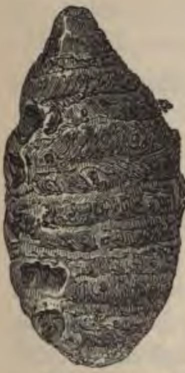
CURCUMA.—TURMERIC.

Origin.—Curcuma longa, *Linné.* *Natural order*, Zingiberaceæ.

Habitat.—Southern Asia; cultivated.

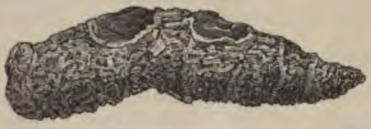
Description.—Oval or oblong, nearly 5 centimeters (2 inches) long and about one-half as thick (round turmeric); or cylindrical branches about 1 centimeter ($\frac{2}{5}$ inch) thick (long turmeric); sometimes cut longitudinally or transversely; externally yellowish-gray, somewhat annulate; internally orange-yellow or brown-yellow, with a dark circular nucleus sheath; fracture flattish, glossy; odor slight ginger-like; taste warm, aromatic, and bitterish; powder deep yellow, turning brown-red by alkalies and borax.

Fig. 67.



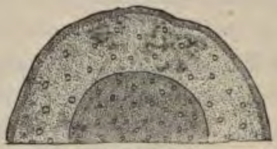
Round turmeric.

Fig. 68.



Long turmeric.

Fig. 69.



Curcuma.—Transverse section, magnified 3 diam.

Varieties.—1. *Chinese turmeric.* Central rhizomes and branches.

2. *Bengal turmeric.* Slender branches, reddish.

3. *Madras turmeric.* Thick branches and transverse sections of central rhizomes.

4. *Java turmeric.* Rather small central rhizomes and branches, usually cut transversely and longitudinally.

5. *Cochinchina turmeric.* Sections of large diameter, rough externally.

Constituents.—Volatile oil 1 per cent., viscid oil 11 per cent., containing curcumol, a little pungent resin, curcumin, starch, mucilage, etc.

Curcumin, $C_{14}H_{14}O_4$, is orange-yellow, resinous, insoluble in water, soluble in alcohol and ether; also with a red-brown color in alkalies; red-brown by boracic acid.

Properties.—Stimulant, tonic; used for coloring ointments and tinctures, and for the detection of alkalies and borates.

CALAMUS.—CALAMUS.

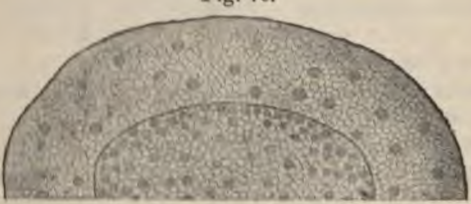
Sweet flag.

Origin.—Acorus Calamus, *Linné.* *Natural order,* Araceæ.

Habitat.—Europe and North America, on the banks of streams and ponds.

Description.—The unpeeled rhizome is directed. In sections of various length, subcylindrical, about 2 centimeters ($\frac{4}{5}$ inch) broad; externally reddish-brown (when peeled pinkish-white), annulate from the distant oblique leaf-scars, on the lower surface marked with the circular scars of the rootlets in wavy lines, longitudinally wrinkled; whitish internally, of a spongy texture, breaking with a short corky fracture, showing numerous yellowish and brownish dots on both sides of the elliptic nucleus sheath; odor aromatic; taste strongly bitter.

Fig. 70.



Calamus.—Transverse section, magnified 3 diam.

Structure.—The predominating tissue is parenchyme containing numerous air-passages; the cells are filled with starch or with oil, the latter being more numerous in the cortical zone. The fibro-vascular bundles are most numerous within and near the nucleus sheath, the latter consisting of rather thin-walled cells.

Constituents.—Volatile oil 1–2 per cent., bitter principle (acorin), resin, starch, mucilage. Acorin is brown-yellow, soft, soluble in water, alcohol, and ether, precipitated by tannin, and is probably a glucoside.

Properties.—Stimulant, carminative, tonic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in powder, infusion, and tincture.

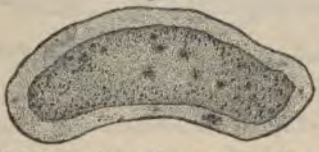
IRIS FLORENTINA.—FLORENTINE ORRIS.

Origin.—Iris florentina, *Linné*, I pallida, *Linné*, and I. germanica, *Linné*, chiefly the last two species. *Natural order*, Iridaceæ.

Habitat.—Northern Italy; cultivated.

Description.—Horizontal, flattened, consisting of joints, 5 to 10 centimeters (2 to 4 inches) long, broadest near the upper extremity, and terminated by a circular scar; peeled, of a whitish color; on the upper side with small fibro-vascular bundles in transverse lines; on the lower side with numerous circular brownish scars; fracture short, somewhat mealy; nucleus sheath prominent in lower half; wood-bundles scattered, crowded within the

Fig. 71.



Iris florentina.—Transverse section.

nucleus sheath; odor violet-like; taste mealy, bitterish, and slightly acrid.

Long, rather slender joints are selected for the use of teething infants, trimmed smoothly and frequently whitened by chalk or magnesia.

Constituents.—Volatile oil, resin, fat, starch, mucilage, bitter extractive. *Oil of orris*, distilled by means of superheated steam, is solid at ordinary temperatures, has an agreeable violet odor, and consists chiefly of myristic acid mixed with a little volatile oil.

Properties.—Errhine, diuretic, in fresh state irritant; used chiefly in dentifrices and perfumery. *Dose*, 0.3 to 1 gram (gr. v–xv).

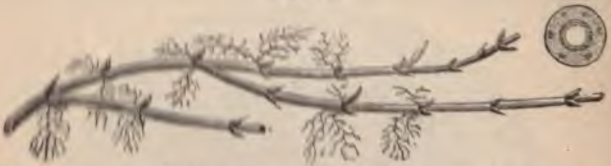
TRITICUM REPENS.—COUCHGRASS.

Triticum, *U. S.*, Rhizoma (Radix) graminis.—Quitch-grass, Quickens.

Origin.—Triticum repens, *Linné*. *Natural order*, Gramineæ.

Habitat.—Europe and North America.

Fig. 72.



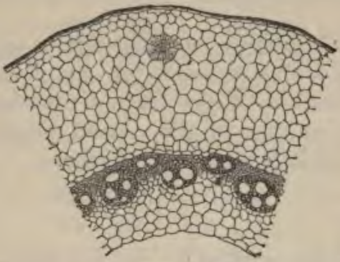
Triticum repens.—Rhizome and transverse section, magnified 3 diam.

Description.—Very long and creeping, the internodes about 5 centimeters (2 inches) long, cut in sections, about 1 centimeter ($\frac{3}{8}$ inch) long, about 2 millimeters ($\frac{1}{12}$ inch) thick, smooth but wrinkled, straw-yellow, hollow in the centre; inodorous, sweet.

It should be gathered in autumn or in early spring and deprived of the rootlets.

Structure.—The cortical zone consists of large parenchyme cells, with about six small wood-bundles, and is free from starch. The woody zone is narrow and yellowish, and incloses a narrow circle of parenchyme, the remnant of the medullary centre.

Fig. 73.



Triticum repens.—Section through portion of rhizome, magnified 65 diam.

Constituents —Glucose, fruit-sugar, a third sugar, and triticin, which resembles inulin.

Properties.—Diuretic, aperient. *Dose*, 2 to 8 grams (ʒss–ij), in decoction and as extract.

CAREX ARENARIA.—RED SEDGE.

Radix sarsaparillæ germanicæ, Radix graminis rubræ.

Origin.—Carex arenaria, *Linné.* *Natural order*, Cyperaceæ.

Habitat.—Central and Northern Europe, near the coast.

Description.—Horizontal, long, internodes 1 to 3 centimeters ($\frac{2}{5}$ to $1\frac{1}{5}$ inch) long, angularly furrowed, brown-gray, the nodes fringed with leaf-sheaths and marked with scars and remnants of rootlets; internally with a large centre containing numerous approximate wood-bundles, and surrounded by a circle of large air-passages; nearly inodorous, sweetish, somewhat bitter, and acrid.

Constituents.—Acrid and bitter principle, sugar, resin, starch.

Properties.—Alterative; used similar to sarsaparilla.

Substitutions.—The rhizomes of many other species of Carex are destitute of the large air-passages, and in many the wood-bundles in the central portion are surrounded by broad layers of parenchyme.

SMILAX CHINA.—China Root.

Origin.—Smilax China, *Linné.* *Natural order*, Smilaceæ.

Habitat.—China, Japan.

Description.—Irregularly tuberous, about 10 or 15 centimeters (4 or 6 inches) long and 3 to 5 centimeters ($1\frac{1}{5}$ to 2 inches) thick, tuberculate by short branches, reddish-brown; internally whitish, mealy, with numerous small brown resin cells, and near the centre with many scattered wood-bundles, but without a nucleus sheath; inodorous, insipid, afterwards bitterish, and slightly acrid.

Substitutions.—Smilax pseudochina, *Linné*, Central and Southern North America. Smaller, less tuberculate, rather spongy, and with few resin cells.

The tubers of Smilax glauca, *Walter*, are yellowish or pale brownish, spongy, and destitute of resin cells.

Constituents.—Smilacin, resin, starch, a little tannin.

Properties.—Alterative; used similar to sarsaparilla.

VERATRUM ALBUM.—White Veratrum.

Origin.—Veratrum album, *Linné. Natural order*, Liliaceæ, Melanthieæ.

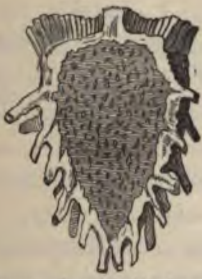
Habitat.—Europe, in mountainous regions.

Description.—It closely resembles American veratrum in all essential characters. Formerly it consisted only of the rhizome, deprived of its rootlets; but the latter are now present, as directed by the German Pharmacopœia.

Constituents.—Jervine, pseudojervine, rubijervine, veratralbine, veratrine (?), jervic acid, resin,

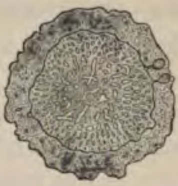
Properties.—Emetic, cathartic, errhine, poisonous. *Dose*, 0.06 to 0.12 gram (gr. j–ij), in powder, mostly externally as ointment in itch, and mixed with an inert powder as snuff.

Fig. 74.



Veratrum.—Longitudinal section.

Fig. 75.



Veratrum.—Transverse section.

VERATRUM VIRIDE.—American Veratrum.

Origin.—Veratrum viride, *Aiton*, nearly allied to Verat. album, var. Lobelianum, *Bernhardt*, of Europe. *Natural order*, Liliaceæ, Melanthieæ.

Habitat.—North America, in rich woods.

Description.—Closely resembles white veratrum. Rhizome obconical, mostly simple, 5 to 8 centimeters (2–3 inches) long, 2 to 3 centimeters (⅘–1⅕ inch) thick, tufted above, truncate below, externally blackish-gray and invested on all sides with numerous shrivelled light-yellowish-brown rootlets, which are about 20 centimeters (8 inches long) and about 3 millimeters (⅛ inch) thick; internally whitish with numerous darker colored dots and short wavy lines within the nucleus sheath; inodorous, bitter, very acrid, sternutatory.

Structure.—Cortical zone about ⅐ of the diameter, consists of parenchyme, containing starch and occasionally calcium oxalate, and has few short-curved wood-bundles. Nucleus sheath wavy, the inner cell walls thickened. Central portion like the cortical zone, but the wood-bundles numerous.

Constituents.—Resin, starch, and alkaloids. Jervine is crystalline, tasteless, not sternutatory, insoluble in water and ether, colored yellow and green by H_2SO_4, the salts insoluble in dilute mineral acids. Veratroidine is uncrystallizable, sternutatory, soluble in ether, colored yellow and red by H_2SO_4. Pseudojervine resembles jervine, but its sulphate is more soluble in water. Rubijervine resembles veratroidine, but is not sternutatory.

Properties.—Emetic, diaphoretic, sedative, errhine. *Dose*, 0.06 to 0.12 gram (gr. j–ij), in powder, or preferably in tincture and fluid extract.

DRACONTIUM.—SKUNK CABBAGE.

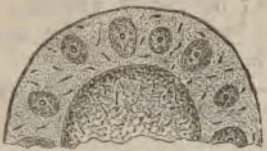
Origin.—Dracontium fœtidum, *Linné*, s. Symplocarpus fœtidus, *Salisbury*. *Natural order*, Araceæ.

Habitat.—North America, in moist grounds.

Description.—Obconical, truncate above and below, 7 to 10 centimeters (3 to 4 inches) long, and about 5 centimeters (2 inches) in diameter, the upper half beset with numerous long, shrivelled rootlets; gray-brown externally; internally whitish, with numerous short bent wood-bundles, which are crowded within the somewhat wavy nucleus sheath. When triturated, it emits a disagreeable odor; taste acrid, biting.

Constituents.—Fat, resin, sugar, gum, starch; the acrid principle, which appears to be altered by heat, has not been isolated.

Fig. 76.



Dracontium.—Section through upper part, natural size.

Properties.—Emetic, diuretic, antispasmodic, stimulant. *Dose*, 0.3 to 1 gram (gr. v–xv), in recent powder or infusion.

TRILLIUM.—Bethroot, Birthwort.

Origin.—Trillium erectum, *Linné*, and other species of Trillium. *Natural order*, Liliaceæ, Asparagineæ.

Habitat.—United States, in damp woods.

Description.—Varying between subglobular and obconical, somewhat tufted above, truncate below, about 3 centimeters (1⅕ inch) long, annulate, orange-brown, rootlets light brown; internally whitish; fibrovascular bundles mostly near the circumference, curved or circular; inodorous; taste sweetish, astringent, bitter and acrid.

Constituents.—Acrid principle (not precipitated by lead acetate, nearly insoluble in water), resin, tannin, starch.

Properties.—Emmenagogue, emetic. *Dose,* 2 to 4 grams (ʒss–j).

CHAMÆLIRIUM.—Starwort.

Origin.—Chamælirium luteum, *Gray,* s. Helonias dioica, *Pursh. Natural order,* Liliaceæ, Melanthieæ.

Habitat.—North America, in low grounds.

Description.—About 25 millimeters (1 inch) long and 6 millimeters (¼ inch) thick, subcylindrical, closely annulate, gray-brown, on upper side few stem-scars, on lower side wiry rootlets; internally whitish; fracture smooth and horny; wood-bundles near the centre numerous; inodorous; taste bitter.

Constituents.—Starch, chamælirin (yellowish glucoside, watery solution frothing, by sulphuric acid colored orange-red, crimson, brown, etc).

Properties.—Tonic, diuretic, anthelmintic. *Dose,* 1 to 4 grams (gr. xv–ʒj).

ALETRIS.—Colicroot, Starwort.

Origin.—Aletris farinosa, *Linné. Natural order,* Hæmodoraceæ.

Habitat.—United States, in sandy woods.

Description.—About 30 millimeters (1⅙ inch) long, and 3 millimeters (⅛ inch) thick, flattened and tufted on upper side, convex and with numerous wiry or whitish rootlets on the convex lower side; indistinctly jointed, brown-gray; fracture mealy, white, somewhat fibrous; inodorous; taste amylaceous, bitter.

Constituents.—Starch, bitter principle.

Properties.—Tonic, emetic, purgative. *Dose,* 0.6 gram (gr. x).

IRIS VERSICOLOR.—Blue Flag.

Iris, *U. S. P.*

Origin.—Iris versicolor, *Linné.* *Natural order*, Iridaceæ.

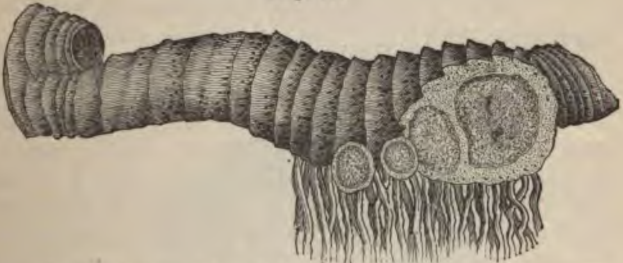
Habitat.—North America, in swampy localities.

Description.—Rhizome horizontal, consisting of joints, 5 to 10 centimeters (2 to 4 inches) long, cylindrical in the lower half, flattish, and about 2 centimeters ($\frac{4}{5}$ inch) broad near the upper extremity, and terminated by a circular scar, annulated from the leaf-sheaths, gray-brown; rootlets long, simple, crowded near the broad end; odor slight; taste acrid, nauseous.

Structure.—The predominating tissue is parenchyme, containing starch and some crystals. The nucleus sheath incloses most of the wood-bundles.

Allied drugs.—Iris virginica, *Linné*, Boston iris, and I. verna, *Linné*, dwarf iris of the United States. The joints of the rhizome are about 25 millimeters (1 inch) long, and about 1 centimeter ($\frac{2}{5}$ inch) broad, brownish-gray; otherwise resembling the above.

Fig. 77.



Iris versicolor.—Joint of rhizome and section of branches.

Constituents.—Acrid resin, fat, sugar, gum, tannin, possibly an alkaloid.

Properties.—Alterative, diuretic, purgative, emetic. *Dose*, 0.3 to 1 gram (gr. v–xv), in powder, or the oleoresin, 0.06 to 0.12 gram (gr. j–ij).

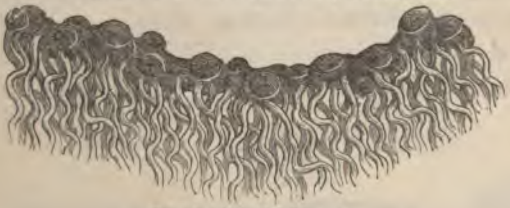
CYPRIPEDIUM.—CYPRIPEDIUM.

American Valerian.

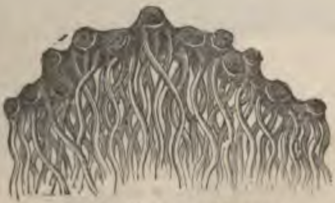
Origin.—Cypripedium pubescens, *Willdenow*, and Cypr. parviflorum, *Salisbury*. *Natural order*, Orchidaceæ.

Habitat.—North America, in swampy places.

Fig. 78.
Portion of rhizome and rootlets, natural size.



Cypripedium pubescens.



Cypripedium parviflorum.

Description.—Horizontal, bent, 10 centimeters (4 inches) or less long, about 3 millimeters ($\frac{1}{8}$ inch) thick;

on the upper side with numerous circular cup-shaped scars; closely covered below with simple wavy rootlets, varying from 10 to 50 centimeters (4 to 20 inches) in length; brittle; dark brown or light orange-brown; fracture short, white; odor faint, but heavy; taste sweetish, bitter, and somewhat pungent.

Cypripedium parviflorum yields the shorter and thinner rhizome with orange-brown rootlets.

Structure.—Cortical parenchymatous zone thickish. Nucleus sheath absent. Wood-bundles approximate, near the centre more distant. The parenchyme contains starch.

Constituents.—Volatile oil (trace), volatile acid, resins, tannin, starch.

Properties.—Diaphoretic, stimulant, antispasmodic. *Dose*, 0.5 to 1 gram (gr. viij–xv), in powder, infusion, or extract.

CONVALLARIA.—CONVALLARIA.

Lily of the valley.

Origin.—Convallaria majalis, *Linné.* *Natural order*, Liliaceæ, Asparagineæ.

Habitat.—United States, in the Alleghany mountains; Europe and Northern Asia.

Description.—Creeping and branched, about 3 millimeters ($\frac{1}{8}$ inch) thick, cylindrical, wrinkled, whitish, the internodes from 2 to 6 centimeters ($\frac{4}{5}$–$2\frac{1}{2}$ inches) long, marked with few circular scars, the joints annulate, and beset with a circle of 8 or 10 grayish branching long rootlets, about 1 millimeter ($\frac{1}{25}$ inch) thick; fracture rather tough, somewhat fibrous, white; the rhizome with a small number of fibrovascular bundles within a thick-walled nucleus sheath, inodorous; taste sweetish, bitter and somewhat acrid.

Constituents.—Convallamarin (white powder, sweet and bitter, soluble in water and alcohol; precipitated by tannin), and convallarin (acrid prisms; sparingly soluble in, but foaming with water); both are glucosides.

Properties.—Heart-tonic, poisonous. *Dose*, 0.1 to 0.4 gram (gr. jss–vj).

POLYGONATUM.—Solomon's Seal.

Origin.—Polygonatum biflorum, *Elliott*, and P. giganteum, *Dietrich*. *Natural order*, Liliaceæ, Asparagineæ.

Habitat.—North America, in woodlands.

Description.—Jointed and annulate, about 15 centimeters (6 inches) long, and 5 millimeters (⅕ inch) thick, somewhat flattened, each joint on the upper side with a circular stem-scar; pale brownish-yellow; fracture short; internally whitish, spongy; wood-bundles most numerous near the centre, not inclosed by a nucleus sheath, inodorous; taste mucilaginous, somewhat acrid.

Smilacina racemosa, *Desfontaines*, false Solomon's seal, has shorter and thicker joints.

Constituents.—Probably the same as in European Solomon's seal from Polygonatum multiflorum, *Mœnch;* convallarin, asparagin, mucilage, sugar, etc.

Properties.—Diuretic, emetic, cathartic.

DIOSCOREA.—Wild Yam, Colic Root.

Origin.—Dioscorea villosa, *Linné*. *Natural order*, Dioscoreaceæ.

Habitat.—United States, in moist thickets.

Description. — Flattish-cylindrical, branched and curved; about 15 centimeters (6 inches) long, and 1 centimeter (⅖ inch) thick, pale brownish, hard; fracture short, somewhat fibrous; internally white with yellowish wood-bundles; inodorous; taste insipid, afterward acrid.

Constituents.—Acrid principle, resin, starch.

Properties.—Expectorant, diaphoretic, emetic. *Dose,* 0.6 to 2 grams (gr. x–xxx).

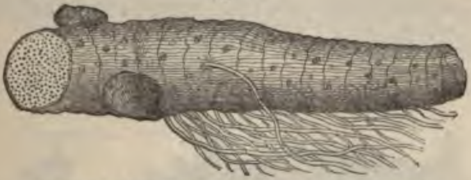
SANGUINARIA.—BLOODROOT.

Origin.—Sanguinaria canadensis, *Linné.* *Natural order*, Papaveraceæ.

Habitat.—North America, in rich woods.

Description.—Horizontal, cylindrical, about 5 centimeters (2 inches) long, 1 centimeter (⅜ inch) thick, somewhat branched, faintly annulate, wrinkled, reddish-brown; fracture short, somewhat waxy, whitish, with numerous small red dots, or of a nearly uniform brownish-red color; rootlets very brittle; odor slight; taste bitter and acrid.

Fig. 79.



Sanguinaria.—Rhizome with transverse section.

It should be collected in autumn.

Structure.—Bark thin; fibrovascular bundles small, not woody, in about two loose circles; rootlets with a thick bark, and a rather thin central fibrovascular column; resin cells axially elongated, scattered in the parenchyme.

Constituents.—Sanguinarine, $C_{19}H_{17}NO_4$, about 1 per per cent., citric and malic acids, resins, starch, about 8 per cent. of ash. Sanguinarine is white, soluble in alcohol and ether, and yields bright red salts having an acrid taste. A second alkaloid is colorless or yellowish, and gives with sulphuric acid a deep purple color, which is deepened by a trace of potassium bichromate. The resins yield protocatechuic acid.

Properties.—Alterative, tonic, stimulant, emetic, sternutatory. *Dose*, 0.2, 0.5, 1 to 4 grams (gr. iij, viij, xv–ʒj), in powder or tincture.

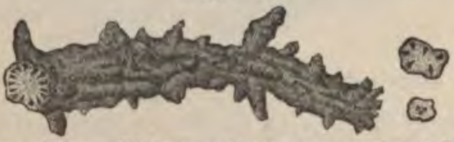
GERANIUM.—GERANIUM, CRANESBILL.

Origin.—Geranium maculatum, *Linné*. *Natural order*, Geraniaceæ.

Habitat.—North America, in woods and thickets.

Description.—Horizontal, cylindrical, 5 to 7 centimeters (2 to 3 inches) long, 12 millimeters (½ inch) or less thick, tuberculated, longitudinally wrinkled, dark brown; fracture short, pale red-brown; rootlets shrivelled, very brittle; inodorous; taste astringent.

Fig. 80.



Geranium maculatum.—Rhizome and transverse section of rhizome and rootlets, natural size.

Structure.—Bark thin, wood-wedges yellowish, small, forming a circle near the cambium line; medullary rays broad; central pith large; rootlets with a thick bark and a thin central column of fibrovascular tissue.

Constituents.—Tannin 13–17 per cent., red coloring matter, starch, pectin, sugar.

Properties.—Tonic, astringent. *Dose*, 1 to 3 grams (gr. xv–xlv).

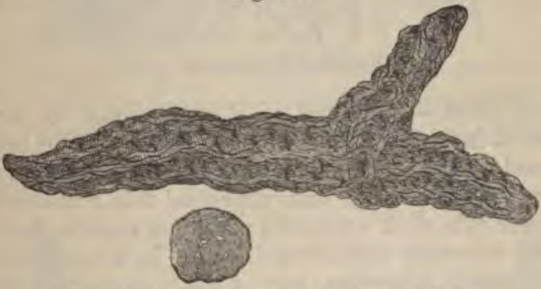
TORMENTILLA.—Tormentil.

Origin.—Tormentilla erecta, *Linné*, s. Potentilla Tormentilla, *Sibthorp*. *Natural order*, Rosaceæ, Dryadeæ.

Habitat.—Europe, in open woodlands.

Description.—Conical, oblong, or nearly cylindrical, occasionally branched, about 5 centimeters (2 inches) long, and 15 millimeters (⅗ inch) thick, with irregular rounded elevations and ridges, depressed stem-scars, and minute scars of the filiform brittle rootlets; brown or reddish-brown; fracture smooth, slightly fibrous; internally light brownish-red; bark thick; wood-wedges small, distant, in one or in two distant circles, inclosing a pith about equal in thickness to that of the bark; inodorous, astringent.

Fig. 81.



Tormentilla.—Rhizome and transverse section.

Constituents.—Tannin (25 per cent.), red coloring matter (tormentil red), kinovic acid, starch, mucilage.

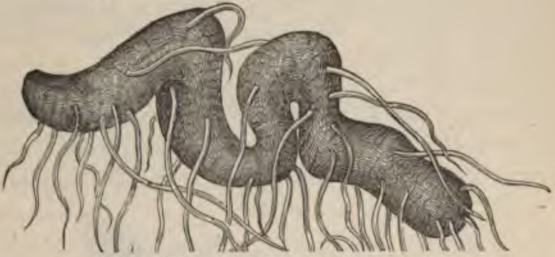
Properties.—Tonic, astringent. *Dose*, 0.6 to 2 grams (gr. x–xxx), in powder or decoction.

BISTORTA.—Bistort.

Origin.—Polygonum Bistorta, *Linné*. *Natural order*, Polygonaceæ.

Habitat.—Europe, Northern Asia, Canada, and Northwestern United States, in swampy meadows.

Fig. 82.



Bistorta.—Natural size.

Description.—Depressed, S-shaped, about 5 centimeters (2 inches) long, and 15 millimeters (⅗ inch) broad, flattened or channelled and transversely striate on the upper side, convex and with depressed thin root-scars on the lower side, dark red-brown; fracture smooth, scarcely fibrous; internally light brownish-red; bark thick; wood-wedges small, numerous, approximate, inclosing a large pith; inodorous, astringent.

Constituents.—Tannin (20 per cent.), red coloring matter, starch.

Properties.—Tonic, astringent. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder or decoction.

NYMPHÆA.—Water-lily.

Origin.—Nymphæa odorata, *Aiton*. *Natural order*, Nymphæaceæ.

Habitat.—United States, in ponds.

Description.—Horizontal, about 50 centimeters (20 inches) long, and 5 centimeters (2 inches) thick, with subcircular leaf-scars on the upper side, and with remnants of rootlets on the lower side; usually in light segments; externally brown; internally whitish or gray; wood-bundles irregular in the spongy parenchyme; inodorous; taste mucilaginous, astringent.

The rhizome of the yellow pond-lily, Nuphar advena, *Nuttall*, is very similar.

Constituents.—Mucilage, tannin, probably alkaloids.

Properties.—Demulcent, astringent. *Dose*, 0.6 to 2 grams (gr. x–xxx).

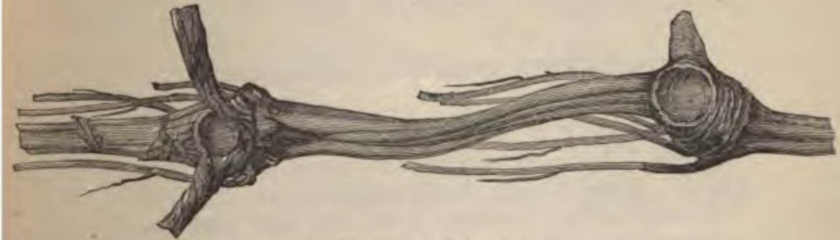
PODOPHYLLUM.—MAYAPPLE.

Origin.—Podophyllum peltatum, *Linné.* *Natural order*, Berberidaceæ.

Habitat.—North America, in rich woods and thickets.

Description.—Horizontal, about 5 millimeters (⅕ inch) thick, nearly cylindrical, consisting of joints about 5 centimeters (2 inches) long, somewhat enlarged at the end, which has a circular scar on the upper side, a tuft of about ten nearly simple fragile rootlets on the lower side, and is sometimes branched laterally; smooth or some-

Fig. 83.



Podophyllum.—Natural size.

what wrinkled, orange-brown; fracture short; internally white and mealy; inodorous; taste sweetish, somewhat bitter and acrid.

Structure.—Bark thickish; wood consisting of about 16 short vascular wedges, placed in a circle and inclosing a large pith; the thin-walled parenchyme contains mainly starch, occasionally calcium oxalate.

Constituents.—Resin 4–5 per cent., starch, sugar. The resin is partly neutral, partly acid (podophyllinic acid); both portions are partly soluble in ether; the acid yields yellow compounds with alkalies and earths.

Podwissotzki announced the presence of podophyllotoxin (white, crystallizable, bitter, faintly acid, sparingly soluble in water), picropodophyllin (crystalline, bitter, insoluble in water), podophyllinic acid (inactive); yellow crystals, perhaps identical with quercetin; green oil, and crystalline fatty acid.

Properties.—Alterative, cholagogue, cathartic. *Dose*, 0.3 to 1 gram (gr. v–xv), in powder or extract; the resin 0.03 to 0.06 gram (gr. ss–j).

ASCLEPIAS CORNUTI.—MILKWEED.

Silkweed.

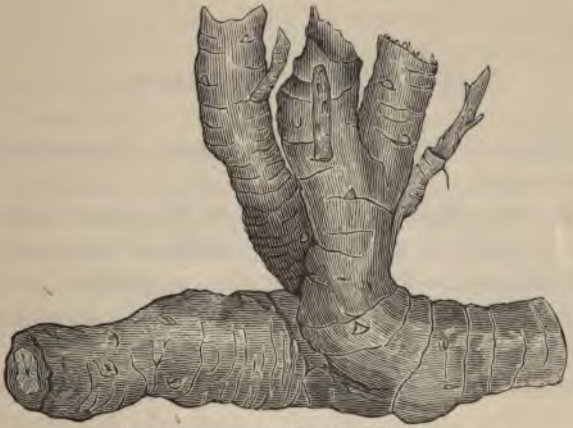
Origin.—Asclepias cornuti, *Decaisne*, s. A. syriaca, *Linné*. *Natural order*, Asclepiadaceæ.

Habitat.—North America, fields and waste places.

Description.—Horizontal, 0.5 to 2 meters (1½–6 feet) long, cut in sections, 6 to 12 millimeters (¼–½ inch) thick, cylindrical, nearly simple, finely wrinkled, somewhat knotty, gray-brown, tough; fracture short or splintery, white; bark rather thick, with laticiferous vessels; wood-wedges yellowish, porous, narrow; nearly inodorous; taste bitterish, nauseous.

Constituents.—Bitter principle, asclepion (tasteless), caoutchouc, resin, tannin, starch, sugar, fat.

Fig. 84.



Asclepias cornuti.—Portion of rhizome.

Properties.—Diuretic, diaphoretic, alterative, emetic. *Dose*, 0.5 to 3 grams (gr. viij–xlv), in powder, infusion, or extract.

ARALIA NUDICAULIS.—FALSE SARSAPARILLA.

Origin.—Aralia nudicaulis, *Linné*. *Natural order*, Araliaceæ.

Habitat.—North America, in rocky woodlands.

Description.—Horizontal, 30 centimeters (12 inches) or more long, about 6 millimeters (¼ inch) thick, wrinkled, annulate above, stem-scars cup-shaped; rootlets few; bark light gray-brown, exfoliating; internally white, with a yellowish wood and spongy pith; fracture short; odor slightly aromatic; taste mawkish.

Constituents.—Probably a little volatile oil, resin, starch, sugar, etc.

Properties.—Stimulant, diaphoretic, alterative. *Dose*, 2 to 4 grams (ʒss–j), in infusion or decoction.

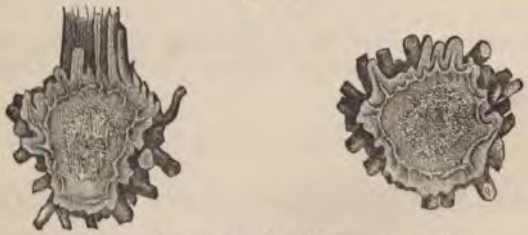
VALERIANA.—VALERIAN.

Origin.—Valeriana officinalis, *Linné*. *Natural order*, Valerianaceæ.

Habitat.—Europe and Northern Asia, naturalized in New England, in moist and dry localities; cultivated.

Description.—Rhizome upright, subglobular or obconical, from 2 to 4 centimeters (⅘ to 1½ inch) long, truncate at both ends, yellowish-brown or brown; internally whitish or pale brownish, waxy or horny. Rootlets numerous, slender, brittle, brown. Odor peculiar, becoming stronger and unpleasant on keeping; taste camphoraceous and bitter.

Fig. 85.



Valeriana.—Longitudinal and transverse section.

Collected from dry localities, the rhizome is small, and has few light brown rootlets; from moist localities, it is larger, has numerous, larger, and darker rootlets, shows at the lower end scars from decayed roots, and contains less volatile oil.

Structure.—Bark rather thin, covered with a thin cork; fibrovascular bundles small, forming a circle and inclosing a thick pith. The rootlets have a thick bark, and a slender central vascular cord. The parenchyme contains starch, extractive matter, or oil drops.

Constituents.—Volatile oil ½–2 per cent.; valerianic, formic, and acetic acids, tannin, resin, starch, mucilage. The volatile oil has the density 0.94, and consists of the alcohol borneol, $C_{10}H_{18}O$, its ether, $(C_{10}H_{17})_2O$, and its compound ethers of formic, acetic, and valerianic acids; these acids are liberated by the gradual decomposition of the compound ethers.

Properties.—Stimulant, anodyne, antispasmodic, nervine. *Dose*, 1 to 6 grams (gr. xv–ʒjss), in infusion, tincture, or fluid extract. The volatile oil, 0.06 to 0.2 gram (gr. j–iij).

ARNICÆ RADIX.—Arnica Root.

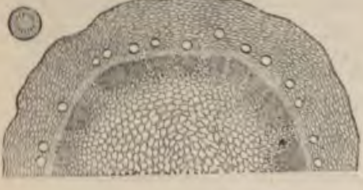
Origin.—Arnica montana, *Linné*. *Natural order*, Compositæ, Senecionideæ.

Habitat.—Europe, Northern Asia, Northwestern America, in mountainous localities.

Description.—Oblique, about 5 centimeters (2 inches) long and 3 millimeters (⅛ inch) thick, brown, sharply wrinkled longitudinally, rough and irregularly annulate from remnants of leaves and stem-bases; fracture short, internally whitish. Radicles thin, about 10 centimeters (4 inches) long, light-brown, fragile. Odor slightly aromatic; taste aromatic, pungent, bitter.

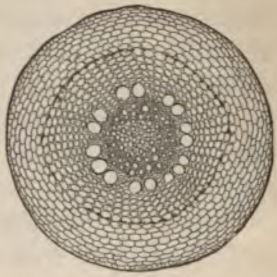
Structure.—Bark thickish, with a thin layer of cork, and near the cambium a circle of resin cells. Wood-wedges short, forming a close circle, and inclosing a large pith. The rootlets have a thick bark, a slender central fibro vascular cord, andsurrounding the latter a circle of few resin cells.

Fig. 86.



Arnica.—Transverse section of rhizome, natural size, and magnified 10 diam.

Fig. 87.



Section, of rootlet, magnified 25 diam.

The rhizome of strawberry, Fragaria vesca, *Linné*, has a similar appearance, but is harder, darker brown, not annulate and contains starch, but no resin cells.

Constituents.—Volatile oil ½–1 per cent., acrid and tasteless resins, arnicin, capronic and caprylic acids, inulin 10 per cent., tannin, mucilage.

Properties.—Irritant, stimulant, diuretic, vulnerary. *Dose*, 0.3 to 2 grams (gr. v–xxx), in powder or infusion.

SERPENTARIA.—Serpentaria.

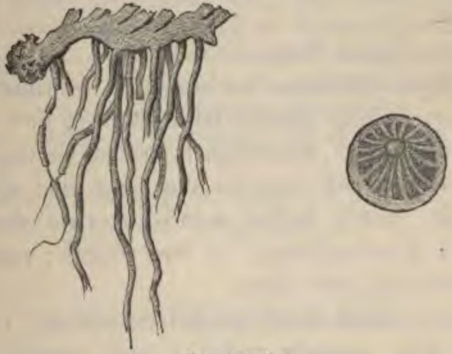
Origin.—1. Aristolochia Serpentaria, *Linné*, and, 2. Aristolochia reticulata, *Nuttall. Natural order*, Aristolochiaceæ.

Habitat.—United States, in hilly woods. No. 1, east of the Mississippi; No. 2, in the Southwestern States.

Description.—Rhizome about 25 millimeters (1 inch) long, thin, bent, on the upper side with approximate short stem-remnants, on the lower side with numerous thin branching rootlets about 10 centimeters (4 inches) long; dull yellowish-brown; internally whitish; odor aromatic, camphoraceous; taste warm, bitterish, and camphoraceous.

The rootlets of Ar. reticulata (Red River or Texas snakeroot) are coarser, longer, and less interlaced than those of Ar. Serpentaria (Virginia snakeroot).

Fig. 88.



Serpentaria.

Rhizome with rootlets. Transverse section of rhizome.

Structure.—Bark thin; wood-wedges longest on lower side of rhizome, separated by broad medullary rays; pith large-celled. Rootlets with a thick bark and a thin central fibrovascular cord. The parenchyme contains starch and, in scattered cells, oil.

Constituents.—Volatile oil ½ per cent., bitter principle, soluble in alcohol and water; little tannin, starch, sugar, albumen.

Properties.—Stimulant, diaphoretic, tonic. *Dose*, 0.3 to 2 grams (gr. v–xxx), in powder, infusion, tincture or fluid extract.

Admixtures.—The subterraneous parts of Panax, Cypripedium, Hydrastis, and others are readily distinguished; Spigelia has no projecting stem-remnants, and in the wood no medullary rays.

SPIGELIA.—Spigelia. Pinkroot.

Origin.—Spigelia marilandica, *Linné*. *Natural order*, Loganiaceæ.

Habitat.—United States, in rich woods.

Description.—Rhizome horizontal, 5 centimeters (2 inches) or more long, about 3 millimeters (⅛ inch) thick, bent, purplish-brown, somewhat branched, on the upper side with cup-shaped scars, on the lower side with numerous thin, brittle, lighter colored rootlets about 10 centimeters (4 inches) long; fracture smooth; somewhat aromatic, sweetish and bitter.

Structure.—Bark thin; wood-circle whitish, thickest on lower side, scarcely radiate; pith usually dark colored or decayed. Rootlets with a thick bark and a slender central fibrovascular cord.

It should not be confounded with the rhizome of Phlox carolina, *Linné* (like Spigelia, known as Carolina pink), which is short, upright, and has a central pith, hard wood, and brownish-yellow, rather coarse, straight rootlets, containing a straw-colored wood underneath a readily removable bark.

Constituents.—Little volatile oil, tasteless resin, bitter principle, tannin, wax, etc.

Properties.—Anthelmintic, toxic, dilates the pupil. *Dose*, 1 to 4 grams (gr. xv–ʒj).

GEUM RIVALE.—WATER AVENS.

Origin.—Geum rivale, *Linné.* *Natural order*, Rosaceæ, Dryadeæ.

Habitat.—North America (south to Pennsylvania); Northern Asia, Northern and Central Europe.

Description.—Horizontal or oblique, about 5 to 7 centimeters (2 to 3 inches) long and 6 millimeters (¼ inch) thick, tuberculate and scaly above, wrinkled; fracture short, waxy, reddish or brownish, with a thin bark, small and distant whitish wood-wedges, and a large pith. Radicles wrinkled, with a thick bark. Odor faintly aromatic; taste astringent, bitterish.

Constituents.—Little volatile oil, tannin, bitter principle, etc.

Properties.—Astringent, tonic. *Dose*, 1 to 3 grams (gr. xv–xlv), in powder or decoction.

GEUM URBANUM.—AVENS.

Radix caryophyllatæ.

Origin.—Geum urbanum, *Linné.* *Natural order*, Rosaceæ, Dryadeæ.

Habitat.—Europe, in shady places.

Description.—Upright or oblique, 3 to 5 centimeters (1 to 2 inches) long, obconical, thinner and abrupt below, tuberculate and scaly, dark brown, hard; upon transverse section, waxy, light purplish-brown; bark thin; wood-circle yellowish, narrow; pith large. Radicles light brown, with a thickish bark. Odor aromatic, clove-like; taste astringent, somewhat aromatic, and bitter.

Constituents.—Little volatile oil, tannin 30 per cent., bitter principle, resin, etc.

Properties.—Astringent, tonic. *Dose*, 1 to 3 grams (gr. xv–xlv), in powder or decoction.

ASCLEPIAS INCARNATA.—Swamp Milkweed.

Flesh-colored Asclepias.

Origin.—Asclepias incarnata, *Linné*. *Natural order*, Asclepiadaceæ.

Habitat.—North America, wet grounds.

Description.—Upright or oblique, about 2 centimeters (⅘ inch) long, irregularly globular or oblong, knotty, yellowish-brown, hard, with a thin bark, tough whitish wood, and rather thick central pith or hollow. Rootlets 10 centimeters (4 inches) or more long, light brown, with the white bark and woody cord of about equal thickness. Inodorous; taste sweetish, acrid, and bitter.

Constituents.—Volatile oil a trace, two acrid resins, alkaloid, pectin, starch, sugar, etc.; ash 8.25 per cent.

Properties.—Alterative, emetic, cathartic. *Dose*, 1 to 3 grams (gr. xv–xlv), in decoction.

HYDRASTIS.—Hydrastis. Golden Seal.

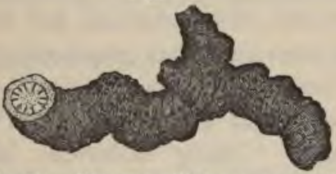
Origin.—Hydrastis canadensis, *Linné*. *Natural order*, Ranunculaceæ, Actæeæ.

Habitat.—North America, east of the Mississippi, in woodlands.

Description.—Obconical and upright, or oblique and subcylindrical, about 4 centimeters (1½ inch) long and 6 millimeters (¼ inch) thick, with short branches, somewhat annulate, and longitudinally wrinkled; externally brownish-gray; fracture short, waxy, bright reddish-yellow; rootlets thin, brittle, about 12 centimeters (5 inches) long; odor slight; taste bitter.

Structure.—Bark thickish, yellow or orange colored. Wood-wedges about 10, narrow, light yellow. The yellow broad medullary rays and large pith like the bark contain starch. Rootlets with a thick yellow bark and subquadrangular woody centre.

Fig. 89.



Hydrastis.—Rhizome with transverse section.

Constituents.—Berberine, $C_{20}H_{17}NO_4$, 3–4 per cent., hydrastine, $C_{22}H_{23}NO_6$, xanthopuccine, starch, sugar, etc. Berberine dissolves in alcohol, slightly in benzol and cold water, and is insoluble in ether and petroleum benzin; its salts are bright yellow, and sparingly soluble in acidulated water; the hot alcoholic solution yields with iodine not in excess dark green lustrous scales. Xanthopuccine resembles berberine, but yields with iodine brown scales. Hydrastine is soluble in alcohol, ether, benzol, and most soluble in chloroform; its salts are white and bitter, but it appears not to combine with organic acids.

Properties.—Tonic, deobstruent, alterative. *Dose,* 0.3 to 3 grams (gr. v–xlv), in decoction or fluid extract.

CAULOPHYLLUM.—Blue Cohosh.

Origin.—Caulophyllum (Leontice, *Linné*) thalictroides, *Michaux*. *Natural order*, Berberidaceæ.

Habitat.—North America, southward to Kentucky, in rich woodlands.

Description.—Horizontal, matted, about 10 centimeters (4 inches) long, and 6 or 8 millimeters ($\frac{1}{4}$–$\frac{1}{3}$ inch) thick, bent, knotty, short branched, and with numerous broad concave stem-scars, dark gray-brown, hard, fracture rather short; internally whitish. Rootlets very numerous, densely matted, about 13 centimeters (5 inches) long, wiry and tough. Nearly inodorous; taste sweetish, slightly bitter, and somewhat acrid, unpleasant.

Structure.—Bark thin; wood-wedges narrow or linear, numerous, elongated or in two circles in the rhizome, in the branches shorter, more uniform, and in a single narrow circle; medullary rays rather broad; pith large. Rootlets with a relatively thicker bark, and a rather thick central woody cord. The parenchyme contains starch.

Admixture.—Hydrastis differs in shape and color.

Constituents.—Saponin, resins.

Properties.—Antispasmodic, diuretic, emmenagogue. *Dose*, 1 to 2 grams (gr. xv–xxx).

COLLINSONIA.—Stoneroot.

Origin.—Collinsonia canadensis, *Linné*. *Natural order*, Labiatae Satureieæ.

Habitat.—North America, in woodlands.

Description.—Horizontal, about 10 centimeters (4 inches) long, and with the very knotty, short, and irregular branches nearly as broad; stem-scars numerous, shallow; externally brown-gray, very hard; internally whitish or grayish; bark very thin; wood-wedges irregular; rootlets numerous, rather brittle; nearly inodorous; taste bitterish, nauseous.

Constituents.—Resinous matter, etc.

Properties.—Diuretic, irritant.

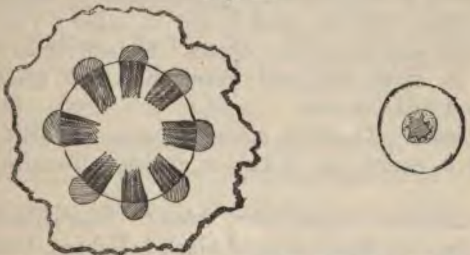
HELLEBORUS.—Black Hellebore.

Origin.—Helleborus niger, *Linné*. *Natural order*, Ranunculaceæ, Helleboreæ.

Habitat.—Central and Southern Europe.

Description.—Upright, irregular knotty, about 5 centimeters (2 inches) long and 1 centimeter ($\frac{2}{5}$ inch) thick, with short, somewhat annulate branches; externally brown-black; internally grayish, with a thick bark, a circle of about 8 wood-wedges, broad medullary rays, and a large pith. Rootlets long, brown-black, very brittle, with a thick bark and a hexagonal wood-centre. Odor slight; taste sweetish, bitterish, and acrid.

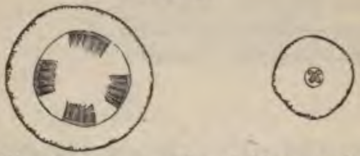
Fig. 90.



Helleborus niger.—Transverse section of rhizome and root, magnified 3 diam.

Helleborus virdis, *Linné*, Green hellebore. The rhizome resembles the preceding, but is of smaller dimensions, and the narrow wood-wedges form three or four groups, separated by broad medullary rays; the woody cord of the rootlets has about 4 obtuse rays. It contains more helleborin, and is considered to be more active than black hellebore.

Fig. 91.



Helleborus viridis.—Transverse section of rhizome and root, magnified 3 diam.

Constituents.—Helleborin, $C_{36}H_{42}O_6$, and helleborein, $C_{26}H_{44}O_{15}$, both poisonous; resin, fat, starch, no tannin. Helleborein predominates, is precipitated by tannin, soluble in water, also in alcohol, not in ether; yields with acids sugar and inert helleboretin. Helleborin is scarcely soluble in ether and cold water, and with acids yields sugar and helleboresin.

Properties.—Diuretic, emmenagogue, cathartic. *Dose,* 0.3 to 1.3 grams (gr. v–xx), in powder, tincture, or extract.

Admixtures.—Actæa alba, *Linné.* The rhizome with rootlets has the dimensions of black hellebore, but closely resembles black snakeroot in structure, and contains tannin.

CIMICIFUGA.—Black Snakeroot.

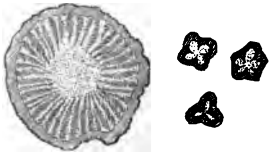
Origin.—Cimicifuga racemosa, *Elliott. Natural order,* Ranunculaceæ, Actæeæ.

Habitat.—North America, in rich woodlands.

Description.—Horizontal, 5 to 15 centimeters (2–6 inches) long, about 2 centimeters ($\frac{4}{5}$ inch) thick, hard, with numerous stout, upright or curved branches, terminated by a cup-shaped scar; brownish-black, hard; fracture smoothish; internally whitish. Rootlets numerous, wiry, brittle, obtusely quadrangular, about 2 millimeters ($\frac{1}{12}$ inch) thick; fracture short. Nearly inodorous; taste bitter and acrid.

Structure.—Bark of rhizome thin and firm; wood-wedges elongated, narrow or linear, most uniform in the branches; medullary rays of about the same width; central pith rather large. Rootlets with a thick bark and a ligneous cord branching into about four broad rays.

Fig. 92.



Cimicifuga.—Transverse section through a branch of the rhizome and through rootlets, natural size.

Constituents. — Crystalline principle (alkaloid?), not precipitated by lead acetate, soluble in chloroform and alcohol, the solution intensely acrid; resin, tannin, starch, gum.

Properties.—Alterative, emmenagogue, sedative. *Dose,* 0.3 to 2 grams (gr. v–xxx) in powder, decoction, or fluid extract.

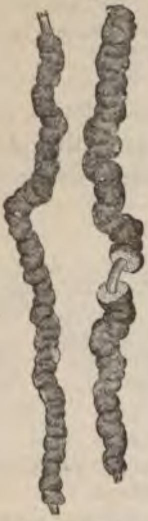
GILLENIA.—GILLENIA. AMERICAN IPECAC.

Origin.—1. Gillenia stipulacea, *Nuttall,* and, 2, Gillenia trifoliata, *Moench. Natural order,* Rosaceæ, Spiræeæ.

Habitat.—United States: No. 1, Western and Southern States; No. 2, east of the Alleghanies.

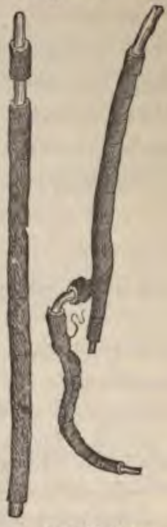
Description.—Horizontal, very knotty, much branched, 10 to 25 millimeters ($\frac{2}{5}$–1 inch) thick, with a thin bark, and numerous tortuous or undulated, annulate and somewhat transversely fissured rootlets having a thick irregular bark, which is brittle, composed of two reddish layers and marked with numerous minute resinous dots; wood tough, whitish, with fine medullary rays, and in the rhizome with a thin pith; nearly inodorous, taste bitter.

Fig. 93.



G. stipulacea.

Fig. 94.



G. trifoliata.

Rootlets, natural size.

The rhizome of Gillenia trifoliata is smaller and less knotty; the rootlets smoother and less distinctly annulate.

Constituents.—Gillenin, resin, tannin, starch, etc. Gillenin is a whitish powder, bitter, neutral, soluble in water, alcohol, and ether, and colored blood-red by nitric acid.

Properties.—Mild emetic. *Dose*, 1 to 2 grams (gr. xv xxx).

TRIOSTEUM.—FEVERROOT, BASTARD IPECAC.

Origin.—Triosteum perfoliatum, *Linné.* *Natural order*, Caprifoliaceæ.

Habitat.—United States, in woodlands.

Description.—Horizontal, 15 centimeters (6 inches) or more long, about 15 millimeters (⅗ inch) thick, knotty-cylindrical, with broad cup-shaped stem-scars, yellowish-brown, bark thin, wood hard, whitish, with fine medullary rays. Rootlets long, about 5 millimeters (⅕ inch) thick, with a thick wrinkled bark. Inodorous; taste bitter, somewhat nauseous.

Constituents.—No analysis.

Properties.—Purgative, emetic. *Dose*, 1 to 2 grams (gr. xv–xxx).

ARALIA RACEMOSA.—American Spikenard.

Origin.—Aralia racemosa, *Linné.* *Natural order*, Araliaceæ.

Habitat.—North America, in rich woods.

Description.—Oblique, 10 or 15 centimeters (4 or 6 inches) long, with prominent concave stem-scars about 3 centimeters (1⅕ inch) broad, pale brown, internally whitish. Roots numerous, long, about 25 millimeters (1 inch) thick at the base, little branched, wrinkled, pale brown, breaking with a short fracture, internally whitish; of a peculiar aromatic odor and taste.

Constituents.—Probably volatile oil, resin, starch, sugar, etc.

Properties.—Stimulant, diaphoretic, alterative, expectorant. *Dose*, 2 to 4 grams (ʒss–j) in infusion.

ASARUM.—Wild Ginger.

Origin.—Asarum canadense, *Linné.* *Natural order*, Aristolochiaceæ.

Habitat.—North America, in rich woodlands.

Description.—Horizontal, 10 centimeters (4 inches) or more long, and 3 millimeters (⅛ inch) thick, irregular quadrangular or almost two-edged, finely wrinkled, grayish-brown or purplish-brown, internally whitish, fracture short; rootlets thin, nearly simple, on the nodes, which are about 12 millimeters ($\frac{1}{2}$ inch) distant; aromatic, pungent, and bitterish.

Structure.—Bark rather thick; cambium layer prominent; wood-wedges short and distant; central pith large. The parenchyme contains starch and occasionally oleoresin or oil, the latter principally in the bark. Rootlets with a thick bark and a thickish ligneous cord.

Constituents.—Volatile oil 1.5–3–5 per cent., resin, coloring matter (asarin), starch, mucilage, sugar, possibly an alkaloid. The volatile oil is of spec. grav. 0.94–0.95, very aromatic, and consists of asarene $C_{10}H_{16}$, a neutral body $C_{12}H_{16}O_2$, asarol $C_{10}H_{18}O$, and the acetic and probably also the valerianic ether of asarol.

Properties. — Carminative, stimulant, diaphoretic. *Dose*, 2 grams (℥ss) in infusion.

Allied Drug.—Asarum europæum, *Linné.* Asarabacca. The rhizome is 1 or 2 millimeters ($\frac{1}{25}$–$\frac{1}{12}$ inch) thick, nearly quadrangular, and is emetic, cathartic, and employed as an errhine.

LEPTANDRA.—LEPTANDRA. CULVER'S PHYSIC.

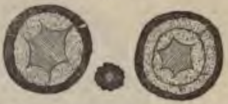
Origin.—Leptandra Virginica, *Nuttall.* *Natural order*, Scrophulariaceæ.

Habitat.—North America, in low grounds.

Description.—Horizontal, 10 to 15 centimeters (4 to 6 inches) long, about 10 millimeters ($\frac{2}{5}$ inch) thick, somewhat flattened, bent, and branched, deep blackish-brown, on upper side with cup-shaped scars, hard, of a woody fracture, internally blackish, with a broad yellowish circle of wood; rootlets thin, wrinkled, very fragile; inodorous; taste bitter and feebly acrid.

Structure.—Bark thin, blackish-gray; wood tough, yellowish in one or two circles; pith large, purplish-brown, often partly destroyed, about six-rayed from the medullary rays. Rootlets with a thick bark and a slender ligneous cord.

Fig. 95.



Leptandra.—Transverse sections of rhizomes and rootlets, natural size.

Constituents.—Leptandrin, resin 6 per cent., saponin, tannin, mannit, gum, and possibly a volatile alkaloid. Leptandrin is crystalline, bitter, soluble in water, alcohol, and ether, not precipitated by lead subacetate. Leptandrin of the eclectics is essentially the alcoholic extract.

Properties.—Alterative, cholagogue, cathartic. *Dose,* 1 to 4 grams (gr. xv–ʒj) in powder and extract.

MENISPERMUM.—YELLOW PARILLA.

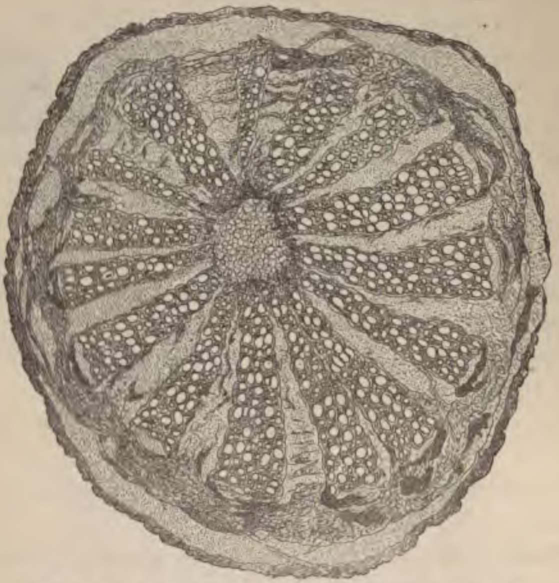
Origin.—Menispermum canadense, *Linné.* *Natural order*, Menispermaceæ.

Habitat.—North America, in moist thickets.

Description.—Cylindrical, 1 meter (40 inches) or more long, about 6 millimeters ($\frac{1}{4}$ inch) thick, finely wrinkled longitudinally, and beset with numerous thin branching and rather brittle rootlets, externally yellowish-brown; fracture tough, woody; internally yellowish; nearly inodorous; taste bitter.

Structure.—Bark thickish with semilunar bast bundles; wood-wedges about 14, broad, porous, separated by rather broad medullary rays; central pith nearly equalling the wood-wedges. The parenchyme contains starch. The overground stem, which is often present, has a large spongy central pith, and short, almost square, wood-wedges.

Fig. 96.



Menispermum canadense.—Transverse section of rhizome.

Constituents.—Berberine, menispine, starch, resin, tannin. Menispine is white, insoluble in benzol and alkalies, and becomes brown by H_2SO_4 and brownish-yellow by $ZnCl_2$.

Properties.—Tonic, alterative, diuretic. *Dose*, 1 to 4 grams (gr. xv-ʒj).

XANTHORRHIZA.—YELLOW ROOT.

Origin.—Xanthorrhiza apiifolia, *L'Heritier.* *Natural order*, Ranunculaceæ, Helleboreæ.

Habitat.—Southern and Central United States.

Description.—Horizontal, 0.5 to 1 meter (20 to 40 inches) long, 1 centimeter ($\frac{2}{5}$ inch) thick, bent, much branched, sparingly beset with brittle fibres, externally light yellowish-brown; bark thin, internally deep yellow, covering a bright yellow tough wood, with a thin pith; inodorous, bitter.

Constituents.—Berberine, starch.

Properties.—Tonic. *Dose*, 2 to 4 grams (ʒss–j) in powder or infusion.

BERBERIS AQUIFOLIUM.—OREGON GRAPE.

Origin.—Berberis aquifolium, *Pursh;* B. nervosa, *Pursh;* and B. repens, *Lindley. Natural order*, Berberidaceæ.

Habitat.—From Colorado westward.

Description.—In more or less knotty and tough pieces, varying from 3 to 25 or 50 millimeters ($\frac{1}{8}$ to 1 or 2 inches) in thickness, with a thin, yellowish-brown, internally bright yellow bark, and a yellow hard wood with fine medullary rays, the rhizome with a thin pith; inodorous and bitter. The rhizome and roots of B. repens and B. nervosa rarely exceed 3 millimeters ($\frac{1}{8}$ inch) in diameter.

Constituents.—Berberine, possibly a second alkaloid, sugar, gum, etc.

Properties.—Tonic, alterative. *Dose*, 0.5 to 2 grams (gr. viij–ʒss) in decoction or fluid extract.

3. TUBERS AND BULBS.—TUBERA ET BULBI.

Tubers are enlarged, more or less fleshy subterraneous stems or branches, or dilated bases of stems, which are not invested with leaves. They consist of either one internode or of several, and hence may develop either a terminal or several lateral buds. The dilated fleshy tuberous base of an annual stem is often designated as a *corm.*

Bulbs are buds with a permanently short, fleshy axis, which is invested with fleshy leaves, called scales, the external layers of the latter usually decaying and becoming dry and papyraceous. The *scaly* bulb has the leaves rather short, thick, and imbricate; in the *tunicated* bulb the leaves are broad, cover the axis and inner leaves completely, or nearly so, and thus form concentric layers. If several small bulbs surround a common axis, and the whole is again invested with fleshy or dry leaves, the *compound* bulb is produced. Bulbous plants are monocotyledons.

Histology.—The arrangement of the tissue in the tubers corresponds with that of the rhizome, while the scales of the bulbs have, like the leaves proper, more or less delicate fibrovascular tissue (veins) imbedded in loose and fleshy parenchyme.

Classification.

TUBERS.—*Sect.* 1. Of Dicotyledons.

With resin cells in circles.	Jalapa.
Without resin cells; turnip-shaped, very acrid.	Aconitum.
subglobose, yellowish, bitterish.	Corydalis.

Sect. 2. Of Monocotyledons.

Ovate with a lateral groove; usually in reniform sections, bitter.	Colchicum.
Depressed globose, above with a zone of rootlets or their scars; acrid.	Arum.
Ovate or roundish; horny; mucilaginous.	Salep.

BULBS, all tunicated.

Single; globular ovate; mostly in sections of the scales; mucilaginous, bitter, acrid.	Scilla.
Compound; mucilaginous, pungent, acrid.	Allium.

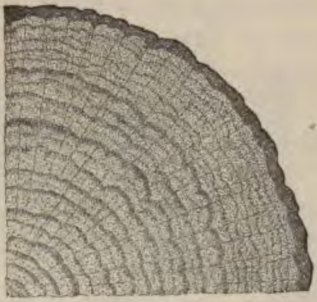
JALAPA.—JALAP.

Origin.—Exogonium Purga, *Bentham. Natural order*, Convolvulaceæ.

Habitat.—Eastern Mexico.

Description.—Napiform, pyriform or oblong, varying in size, the larger ones incised, more or less wrinkled, dark brown, with lighter-colored warts and short transverse ridges, hard, compact, internally pale grayish-brown, with numerous concentric circles; fracture resinous, not fibrous; odor slightly smoky and sweetish; taste sweetish and acrid.

Fig 97.



Jalap.—Transverse section, natural size.

Structure.—The predominating tissue is parenchyme, containing starch, which in the outer layers is pasty. Bark thin, in the inner layer, with a dense zone of resin cells. Wood-bundles small, distant and indistinct; the concentric circles formed of resin cells, arranged in wavy, narrow, or somewhat broader zones.

Quality.—10 grams of jalap should yield not less than 1.2 gram (or 12 grains for 100 grains of jalap) of resin, which should be only slightly soluble in ether.

Constituents.—Starch, gum, sugar, etc., resin 12 to 18 or 22 per cent.; about $\frac{1}{10}$ of the resin is soluble in ether, also in alkalies, and reprecipitated by acids; the remainder is the glucoside convolvulin $C_{62}H_{100}O_{32}$, which is soluble in alkalies and converted into convolvulic acid, soluble in water.

False Jalaps.—Tampico jalap, from Ipomœa simulans, *Hanbury.* Irregular, globular or elongated, deeply wrinkled, without transverse ridges or scars, yields 10 to 15 per cent. resin (tampicin), almost wholly soluble in ether.

Fusiform (male or light) jalap, jalap stalks; from Ipomœa orizabensis, *Ledanois.* Spindle-shaped, but mostly divided longitudinally and transversely, in sections or rectangular irregular pieces; the transverse section distinctly radiate from thick porous wood-bundles. The resin, jalapin, is completely soluble in ether.

Mechoacanna root, from Convolvulus Mechoacanna, *Vandelli*, and perhaps from other plants; in sections, light, whitish, mealy, contains little resin.

Properties.—Diuretic, hydragogue cathartic. *Dose*, 0.5 to 2 grams (gr. viij–ʒss).

ACONITI RADIX.—Aconite Root.

Aconitum, *U. S. P.*

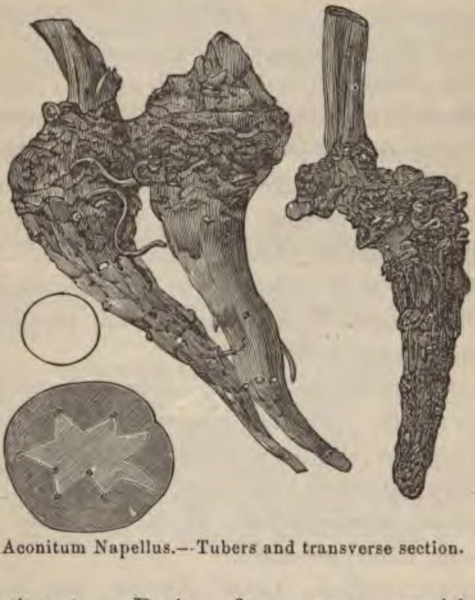
Origin.—Aconitum Napellus, *Linné.* *Natural order*, Ranunculaceæ, Helleboreæ.

Habitat.—Mountainous districts of Europe, Asia, and western North America.

Characters.—About 18 millimeters ($\frac{3}{4}$ inch) thick at the crown, conically contracted below, about 5 centimeters (2 inches) long, with scars or fragments of radicles, externally dark brown, fracture short, amylaceous, or horny; internally whitish or brownish; odor none; taste sweetish, soon acrid, producing a sensation of tingling.

Structure.—Bark thick, in the inner layer composed of small cells. Nucleus sheath about 7-rayed. Vascular bundles small, located at the termination, sometimes also at the base of the rays. Pith large-celled. The parenchyme contains starch.

Fig. 98.



Aconitum Napellus.—Tubers and transverse section.

Constituents. — Resin, fat, sugar, aconitic acid, $H_3C_6H_3O_6$, and about 0.07 per cent. of alkaloids, consisting of aconitine, $C_{33}H_{43}NO_{12}$, pseudaconitine, $C_{36}H_{49}NO_{11}$, aconine, $C_{26}H_{39}NO_{11}$, pseudaconine, $C_{27}H_{41}NO_8$, picraconitine, $C_{31}H_{45}NO_{10}$. These alkaloids and one or two amorphous bases are contained in commercial aconitine. By heating in sealed tubes aconitine is decomposed into benzoic acid and aconine, and pseudaconitine into dimethyl-protocatechuic acid and pseudaconine.

Properties.—Anodyne, sedative, poisonous. *Dose,* 0.06 to 0.12 gram (gr. j–ij) in tincture.

Other Aconite Roots.—Aconitum Cammarum, *Jacquin,* Europe; globular-ovate, about 15 millimeters (⅗ inch) long, the rays of the pith about five in number, rather short and rounded.

Aconitum Stœrckeanum, *Reichenbach,* Europe; slender conical, the pith roundish pentagonal.

Aconitum ferox, *Wallich.* Bikh or bish, Indian aconite. From 5 to 10 centimeters (2 to 4 inches) long, and 25 millimeters (1 inch) or more in diameter above, conical, brown, internally whitish, mealy or horny, intensely acrid. The roots of Ac. uncinatum, *Linné;* Ac. luridum, *Hooker filius et Thomsen,* and perhaps others are said to be collected with it. The constituents are similar to those of Ac. Napellus, but pseudaconitine predominates among the alkaloids.

Japanese and Chinese aconite, obtained from different unknown species. The tubers are napiform or elongated, the pith circular, elliptic, or more or less five- to seven-rayed; very poisonous; contains japaconitine, $C_{66}H_{88}N_2O_{21}$.

Aconitum heterophyllum, *Wallich,* India. Conical or fusiform, bitter, not acrid.

Aconitum Anthora, *Linné,* Europe; long, fusiform; pith thin, with short and longer rays.

Aconitum Lycoctonum, *Linné,* Europe; oblique, several-headed rhizome with elongated conical rootlets, bitter.

CORYDALIS.—TURKEY CORN, SQUIRREL CORN.

Origin.—Dicentra canadensis, *De Candolle*, s. Corydalis canadensis, *Goldie*. *Natural order*, Fumariaceæ.

Habitat.—Canada and mountains of United States, south to Kentucky.

Description.—Depressed globose, about 6 millimeters (¼ inch) thick, with a scar on each of the depressed sides, tawny-yellow, internally whitish or yellowish, horny or rather mealy, inodorous, bitter.

The rhizome of Dicentra eximia, *De Candolle*, s. Corydalis formosa, *Pursh*, is scaly.

Constituents.—Acrid and tasteless resin, starch, mucilage, fumaric acid, and corydaline, which is very bitter in solution.

Properties.—Tonic, diuretic, alterative. *Dose*, 0.6 to 2 grams (gr. x–xxx), in powder or extract.

COLCHICI RADIX.—COLCHICUM ROOT.

Origin.—Colchicum autumnale, *Linné*. *Natural order*, Melanthaceæ.

Habitat.—Southern and Central Europe.

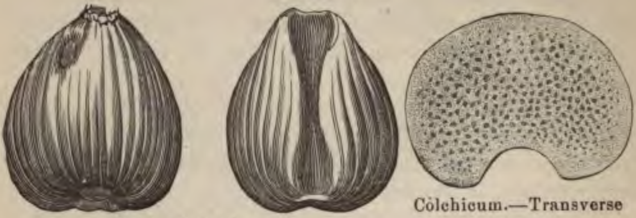
Description.—About 25 millimeters (1 inch) long, ovoid, flattish and with a groove on one side; externally brownish and wrinkled; internally white and solid; often in transverse slices, reniform in shape, breaking with a short mealy fracture, inodorous, taste sweetish, bitter, and acrid.

Colchicum root breaking with a horny or very dark-colored fracture should be rejected.

Structure.—The predominating tissue is parenchyme, containing starch and occasionally raphides; vascular bundles numerous, scattered; nucleus sheath wanting.

Constituents.—Starch, gum, sugar, resin, fat, colchicine. (See Colchici Semen.)

Fig. 99.



Tuber of Colchicum.

Colchicum.—Transverse section.

Properties.—Cathartic, emetic, sedative; in gout and rheumatism. *Dose*, 0.1 to 0.5 gram (gr. iss–viij) in powder, wine, fluid extract, or extract.

ARUM.—Indian Turnip, Dragon Root.

Origin.—Arisæma (Arum, *Linné*) triphyllum, *Torrey. Natural order*, Araceæ.

Habitat.—North America, in rich woods.

Description.—Depressed globular, 2 to 5 centimeters (⅘ to 2 inches) broad, above with a zone of numerous simple rootlets, externally brown-gray, internally white, mealy, with scattered wood-bundles; inodorous, taste burning acrid.

Constituents.—Starch, mucilage, sugar, fat, a volatile acrid principle, soluble in ether.

European dragon-root, from Arum maculatum, *Linné; A.* Dracunculus, *Linné;* and A. italicum, *Lamarck.* Oval or oblong, with radicles on the lower side, in commerce often peeled, and in white mealy sections; very acrid.

Properties.—Stimulant, diaphoretic, expectorant, irritant. *Dose*, 0.5 to 1 gram (gr. viij–xv), in powder, mixed with honey, externally in ointment.

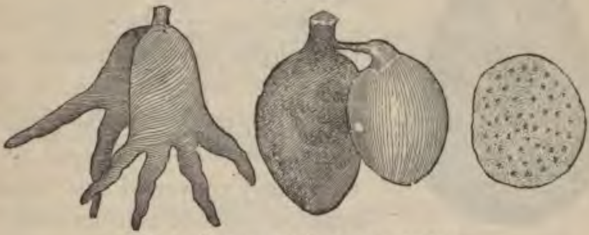
SALEP.—Salep.

Origin.—Orchis mascula, *Linné*, O. Morio, *Linné*, and other species of Orchis. *Natural order*, Orchidaceæ.

Habitat.—Central and Southern Europe, in rich woods.

Description.—Oblong or ovate, 25 millimeters (1 inch) or less long, deprived of the epidermal layer, and scalded, brown-yellow, hard, translucent, internally horny; inodorous, taste insipid. The tissue contains scattered vascular bundles, parenchyme with starch, or occasionally with raphides, and large cells containing mucilage. The powder is pale grayish-yellow.

Fig. 100.



Salep.—Tubers and transverse section.

The tubers of Orchis latifolia, *Linné*, O. maculata, *Linné*, and others, closely resemble the preceding, but below are palmately divided (radix palmæ Christi).

Constituents.—Starch 27, mucilage 48, sugar, proteids, and ash about 2 per cent. One part of powdered salep with 50 of boiling water yields, after cooling, a jelly.

Properties.—Demulcent, nutritive.

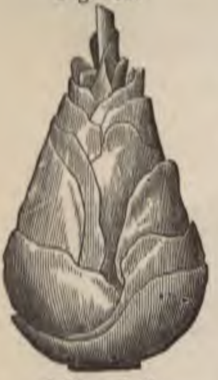
SCILLA.—Squill.

Origin.—Urginea Scilla, *Steinheil*, s. Scilla maritima, *Linné*. *Natural order*, Liliaceæ, Lilieæ.

Habitat.—Basin of the Mediterranean near the sea.

Description.—Broadly ovate or pear-shaped, 10 to 15 centimeters (4–6 inches) in diameter; in commerce usually the fleshy scales, rejecting the insipid inner ones; narrow segments about 5 centimeters (2 inches) long, slightly translucent, yellowish-white or reddish, brittle and pulverizable when dry, flexible on exposure; inodorous, mucilaginous, bitter and acrid.

Fig. 101.



Scilla.—Bulb.

Structure. — The thin-walled parenchyme contains mucilage and numerous raphides, and is traversed by parallel vascular bundles.

Constituents.—Mucilage, sinistrin (easily converted into sugar), sugar, crystals of calcium oxalate; the active principles are scillipicrin (hygroscopic, bitter, very soluble in water, acts upon the heart), scillitoxin (bitter burning taste, soluble in alcohol, acts upon the heart), and scillin (soluble in alcohol and boiling ether, produces numbness, vomiting, etc.) [Merck]. Jarmersted's scillain is a glucoside, soluble in alcohol, poisonous.

Properties.—Expectorant, diuretic, cathartic, emetic, irritant. *Dose*, 0.03 to 0.3 or 0.6 gram (gr. ss–v–x), in powder, vinegar, syrup, or tincture.

ALLIUM.—Garlic.

Origin.—Allium sativum, *Linné.* *Natural order*, Liliaceæ, Lilieæ.

Habitat.—Asia and Southern Europe, cultivated.

Description.—Bulb subglobular, compound, consisting of about eight compressed wedge-shaped bulblets, which are arranged in a circle around the base of the stem and covered by several dry membranaceous scales. It has a pungent, disagreeable odor, and a warm, acrid taste. It is used only in the fresh state.

Hybrids of the above species with Allium Porrum, *Linné*, and perhaps with other species of Allium are frequently met with.

Constituents.—Mucilage 35 per cent., albumen, volatile oil ¼ per cent., consisting of oxide and sulphides ot allyl (C_3H_5).

Properties.—Stimulant, diuretic, expectorant, anthelmintic, irritant.

Dose.—2 to 4 grams (ʒss–j), as expressed juice or syrup.

4. TWIGS AND WOODS—STIPITES ET LIGNA.

The twigs are the overground stems and branches of perennial herbaceous or suffruticose plants, deprived of leaves, flowers, and fruit; they consist of a woody column, inclosing a pith and covered by a green bark. The twigs of one plant only are now officinal.

The medicinal woods are derived from dicotyledonous trees, and as used in pharmacy have the bark removed.

Histology.—The woods consist principally of prosenchyme, the elongated wood-fibres with tapering ends and thickened cell-walls, associated with ducts, which, upon transverse section, appear as pores. With the exception of the annular and spiral ducts near the medullary sheaths, the ducts are mostly dotted. The wood of Coniferæ is destitute of ducts, and the wood-fibres, on their lateral walls, are marked with disks. The wood incloses a pith composed of parenchyme, and is radially dissected by medullary rays, which, upon transverse section, appear as fine lines, separating the narrow wood-wedges, upon radial section as broader bands, and upon tangential section as short vertical striæ, which are narrowed at both ends. The medullary rays consist of parenchyme cells, somewhat elongated in the radial direction, forming either a single row, or broader rows of two or more cells, and vertically a layer of six or more cells. Parenchyme is also found in some woods accompanying the ducts; its cells are vertically elongated and it is designated as wood parenchyme. The wood-cells formed in the spring are larger, those formed towards the close of the season are much thinner; the annual layers or circles of wood are thus plainly indicated by the abrupt transition from the growth of one year to that of the next. In woods from tropical countries the annual layers are less distinctly marked, and often cannot be recognized. The inner layer of wood, from deposits upon its cell-walls, is harder, denser, and frequently of a darker color than the outer layer; the former is called the heartwood or duramen, the latter is the sapwood, or alburnum.

The structural characters of the dicotyledonous woods depend upon the vertical course of the wood-fibres, the width and thickness of the medullary rays, the size and distribution of the ducts, the presence or absence of the wood-parenchyme, etc.

Classification.

Twigs; nodes alternate; cylindrical; taste bitter-sweet.	Dulcamara.
pentangular; taste bitter, nauseous.	Scoparius (see Herbs).
Woods containing ducts.	
Annual layers distinct.	
Pale reddish-brown; soft; aromatic.	Sassafras.
Annual layers indistinct, or with irregular circles of wood-parenchyme.	
Bark present; yellowish-gray; bitter.	Gouania.
Bark mostly absent; wood whitish, very bitter.	Quassia.
greenish-brown, heavy, taste somewhat acrid.	Guaiacum.
dark-red, ducts large; nearly tasteless, not coloring water.	Santalum rubrum.
dark-red, ducts fine; astringent and sweetish, tinging water red.	Hæmatoxylon.
yellowish or whitish, ducts fine; on rubbing aromatic.	Santalum album.

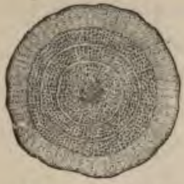
DULCAMARA.—BITTERSWEET.

Origin.—Solanum Dulcamara, *Linné.* *Natural order*, Solanaceæ.

Habitat.—Europe and Asia; naturalized in North America.

Description.—Cylindrical, somewhat angular; longitudinally striate, more or less warty; usually hollow in

Fig. 102.



Dulcamara.—Transverse section. Magnified 3 diam.

the centre; about 6 millimeters ($\frac{1}{4}$ inch) or less thick, cut into short sections; externally pale greenish or light greenish-brown, marked with alternate leaf-scars, and internally green, with a greenish or yellowish wood. Odor slight; taste bitter, afterwards sweet.

Structure.—Cork thin, brown; bark thickish, with few bast fibres; and an inner layer with narrow medullary rays; wood in one or two circles with large ducts and numerous one-rowed medullary rays; pith prominent, but mostly hollow. The parenchyme contains starch and chlorophyll.

Constituents.—Resin, gum, wax, an amorphous alkaloid (solanine ?), and the glucoside dulcamarin, $C_{22}H_{34}O_{10}$, which is soluble in water and alcohol, yields frothing solutions, and has a bitter and sweet taste.

Properties.—Deobstruent, alterative, resolvent, anodyne. *Dose*, 4 to 8 grams (ʒj–ij), in decoction, fluid extract, or extract.

SASSAFRAS LIGNUM (RADIX).—SASSAFRAS WOOD (ROOT).

Origin.—Sassafras officinale, *Nees.* *Natural order*, Lauraceæ.

Habitat.—North America, woods.

Description.—In branching billets or logs, partly covered with bark, or in chips; pale brownish or reddish, coarse-grained, soft, with narrow medullary rays and large ducts; odor and taste aromatic.

Constituents.—Volatile oil.

Properties and Uses.—Like sassafras bark.

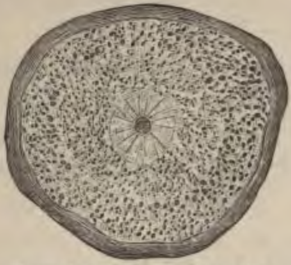
GOUANIA.—Chewstick.

Origin.—Gouania domingensis, *Linné.* *Natural order*, Rhamnaceæ.

Habitat.—West Indies.

Description.—Pieces of stems about 12 millimeters (½ inch) thick; externally brownish gray, wrinkled; internally yellowish gray; fracture fibrous; bark thin; wood porous; medullary rays fine; the parenchyme contains many cells with crystals; inodorous, taste bitter.

Fig. 103.



Gouania.—Transverse section.

Constituents.—Bitter principle.

Properties.—Tonic.

QUASSIA.—Quassia.

Origin.—Picræna (Simaruba, *De Candolle*, Quassia, *Swartz*) excelsa, *Lindley.* *Natural order*, Simarubaceæ.

Habitat.—Jamaica.

Description.—Various sized billets, dense, tough, of medium hardness, freed from the thick tough bark, internally porous, yellowish white, radially striate and marked with irregular circles; in the shops usually in raspings or chips; inodorous, intensely bitter.

Structure.—Ducts large, mostly in small groups; medullary rays of about three rows of cells; circular zones of wood parenchyme distinct; central pith thin. Externally and internally occasionally with blackish patches or lines from the mycelium of a fungus.

Surinam quassia, from Quassia amara, *Linné*, is in much thinner billets, has a thin, brittle bark, smaller ducts, narrower zones of wood parenchyme, and indistinct medullary rays of only one cell in width.

Constituents.—Mucilage, pectin, resin, quassin, $C_{10}H_{12}O_3$; the latter is soluble in alcohol and water, is precipitated by tannin, and is very bitter.

Properties.—Tonic, febrifuge. *Dose,* 1 to 4 grams (gr. xv–ʒj), in infusion, tincture, or extract.

GUAIACI LIGNUM.—Guaiacum Wood.

Origin.—Guaiacum officinale, *Linné*. *Natural order,* Zygophyllaceæ.

Habitat.—West India and Northern South America.

Description.—In billets and logs, with a yellowish alburnum; heavy, hard, brown or greenish-brown, resinous, internally marked with irregular concentric circles; splitting very irregularly, splintery; when heated emitting a balsamic odor; taste slightly acrid.

Used in the form of raspings, which should be greenish-brown, contain few particles of a whitish color, and on the addition of nitric acid, acquire a dark blue-green color.

Structure.—The predominating tissue consists of wavy interwoven wood-fibres, with numerous one-rowed medullary rays, large single ducts and narrow lines of wood parenchyme arranged in irregular circles. All cells contain resin.

Constituents.—Resin 20 to 25 per cent. (see Guaiaci resina); extractive, soluble in water, 3 to 4 per cent.

Properties.—Diaphoretic, alterative. *Dose*, 2 to 8 grams (ʒss–ij), in decoction.

SANTALUM RUBRUM.—RED SAUNDERS.

Origin.—Pterocarpus santalinus, *Linné filius. Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—Madras, cultivated.

Description.—In billets deprived of the light-colored sapwood, heavy, hard; splitting coarsely splintery; externally dark red-brown; the fresh transverse section deep red, marked with lighter red indistinct radiating lines and distinct irregular concentric circles; inodorous and nearly tasteless; on maceration in water, does not color it. Used in the form of chips or of an irregular powder, of a deep brown-red or purplish-red color.

Structure.—Ducts large; medullary rays one-rowed; wood parenchyme in interrupted irregular circles. The cells contain red resinous coloring matter, the parenchyme also crystals of calcium oxalate.

Constituents.—Santalic acid, red needles, soluble in ether with a yellow, and in alkalies with a violet color. Santal, $C_8H_6O_3$, and pterocarpin, $C_{17}H_{16}O_5$, are colorless, insoluble in water; the solution of the former in alkalies turns red and green. The coloring matter fused with HKO yields resorcin.

Used for coloring tinctures.

HÆMATOXYLON.—Logwood.

Origin.—Hæmatoxylon campechianum, *Linné. Natural order*, Leguminosæ, Cæsalpineæ.

Habitat—Central America, naturalized in the West Indies.

Description.—In logs; heavy, hard, splitting irregularly, externally blackish-purple, often with a green metallic lustre; fracture coarse splintery; internally brown-red, finely porous, marked with irregular concentric circles and numerous delicate radiating lines; odor faint agreeable; taste sweetish, astringent; colors the saliva dark pink. Used in the form of small chips or coarse powder of a dark brown-red color, often with a greenish lustre.

Structure.—Ducts rather fine, medullary rays about two-rowed; wood parenchyme in broader wavy circular lines. The coloring matter is deposited mainly in the wood-fibres and ducts.

Constituents. — Hæmatoxylin, $C_{16}H_{14}O_6$, colorless, sweet, soluble in water and alcohol, turning red in sunlight, purplish by alkalies; yields hæmatein, which has a green metallic lustre. Also tannin, fat, resin.

Properties.—Astringent, tonic. *Dose*, 2 to 4 grams (ʒss–j) in decoction or extract.

SANTALUM ALBUM.—Sandalwood.

Origin.—1. Santalum album, *Linné;* 2. S. Yasi, *Seemann*, and other species. *Natural order*, Santalaceæ.

Habitat.—1. India; 2. Fijee Islands; other species in Australia, the Sandwich Islands, etc.

Description.—In billets, or logs, splitting readily, heavy, hard, yellowish, brownish or whitish, marked with darker circles; medullary rays very narrow; ducts thin; odor when rubbed aromatic, somewhat musk-like; taste aromatic.

Constituents.—Resin, tannin, volatile oil 1–4 per cent.; the latter is yellow, thick; sp. grav. .96; readily soluble in alcohol while fresh, strongly aromatic, but varying somewhat with its origin.

Properties.—The volatile oil stimulant, sudorific, used in gonorrhœa in doses of 0.5 to 1 or 1.5 gram (gr. viij–xv–xxij); also in perfumery; the wood for fancy articles.

5. BARKS.—CORTICES.

Barks constitute the outer layer of dicotyledonous stems and roots, separated from the wood by the cambium layer, and are collected mostly from the trunk or stem and its larger branches, in a few cases from the root. The outer surface of the bark is not unfrequently beset with larger or smaller patches of lichens; the inner surface, immediately after the removal of the bark from the wood, is mostly whitish or light colored and smooth, but darkens more or less on drying, and often becomes rough or ridged in consequence of the unequal shrinkage of different parts of the tissue.

Histology.—The bark consists originally of two layers, the outer bark wholly composed of parenchyme, containing chlorophyll; and the inner bark, bast or liber, which is composed of vertically elongated bast parenchyme, and of bast prosenchyme or liber fibres, and this tissue is radially dissected by medullary rays, formed of radially elongated parenchyme. The epidermis is present only in very young barks; its place is soon taken by the primary cork, which is frequently present in wart-like projections, or in longitudinal or transverse ridges, and is composed of tangentially flattened cells. The secondary cork, composed of similar cells, penetrates in layers or bands into the outer or inner bark, and the exterior tissue cracks off in layers or falls away by decay. The tissues which may be present in barks are, 1, the epiphlœum or exophlœum, formed by the primary cork; 2, the mesophlœum, primary or outer bark, also sometimes called middle bark; or these two layers may have been thrown off, so that the external layer is formed by 3, the rhytidoma, or secondary cork; 4, the endophlœum or liber. The term periderm is often used to designate the external corky layer, whether it be epiphlœum or rhytidoma, but is by some authors confined to the latter. The parenchyme of some barks contains cells in which volatile oil, resin, mucilage, or crystals are found; and others in which the cell-walls become considerably thickened and indurated, producing the gritty cells or stone cells or sclerenchyme.

Aside from the natural color of the tissue, the appearance of the outer surface of the medicinal barks depends upon the presence or absence of lichens, epiphlœum, mesophlœum and rhytidoma, and the appearance of the inner surface upon the degree of shrinkage in drying of the medullary rays and bast parenchyme. The breadth of the medullary rays on the one hand, and the radial or lateral arrangement of the bast cells on the other hand, cause the radial, lateral (tangential) or checkered markings upon the transverse section of the inner bark.

Classification.

Sect. 1. Taste bitter and astringent.

Bast fibres with a minute cavity, single, in short radial lines or small groups.	Cinchona.
Bast fibres with larger cavity, in close radial lines; copper-colored.	Remijia.
Bast indistinctly tangentially striate; cork removed; fracture granular.	Nectandra.
Bast radially striate, pale red; periderm brown.	Cornus florida.
Bast radially striate, cinnamon-colored; periderm brown-gray; bark thin.	Cornus circinata.
Bast radially striate, pale brown; periderm purplish-brown; bark thin.	Cornus sericea.
Bast radially striate, whitish; periderm purplish-brown.	Liriodendron.
Bast radially striate, whitish; periderm gray, or brownish.	Magnolia.
Bast radially striate, yellowish; periderm grayish, dotted.	Prinos.
Bast radially striate, rust-brown; periderm green-brown.	Prunus virginiana.
Bast layers tangential, checkered, yellow, exfoliating.	Berberis.
Bast layers tangential, checkered, pale cinnamon-colored.	Salix.
Bast indistinctly striate, whitish; periderm purplish or grayish-brown.	Viburnum.

Sect. 2. Taste astringent.

Bast checkered, pale brown; inner surface ridged; saliva not tinged.	Quercus alba.
Bast checkered, pale brown; inner surface ridged; saliva tinged yellow.	Quercus nigra.
Bast tangentially striate; periderm blackish; inner surface smooth, brownish; tough,	Rubus.
Bast scarcely striate, yellowish; inner surface smooth; fracture short.	Granatum.

Sect. 3. Taste bitter, not aromatic.

Bast radially striate, whitish; inner surface smooth, fracture splintery.	Fraxinus.
Bast radially striate, pale brownish; bark tough.	Simaruba.
Bast radially striate, whitish; periderm blackish; bark tough.	Quassia excelsa.
Bast radially striate, whitish; periderm gray; bark brittle.	Quassia amara.
Bast radially striate, grayish, dotted; slightly acrid.	Condurango
Bast scarcely striate, brownish-yellow; periderm dark gray.	Frangula.
Bast scarcely striate, yellowish; periderm gray and whitish.	Rhamnus Purshiana.
Bast somewhat checkered; internally with blue-green patches; odor opium-like.	Piscidia.
Bast checkered, brown and white; cork removed; inner surface striate.	Juglans.
Bast yellowish-brown, dotted; outer bark in undulated layers.	Quebracho.
Bast tangentially striate, yellowish; cork rust-brown, tasteless.	Azedarach.

Sect. 4. Taste acrid or pungent.

Slender prickles in transverse rows.	Aralia spinosa.
Brown-gray, inner surface whitish; fracture short; spines brown, two-edged.	Xanthoxylum fraxineum.
Brown-gray, inner surface whitish; fracture short; spines brown, stout, upon a thick, corky base.	Xanthoxylum carolinianum.
Reddish-brown, with thin grayish cork; fracture short.	Myrica.
Red-brown; internally with brown-yellow spots; brittle.	Erythrophlœum.
Bast tangentially striate, tough, whitish; periderm greenish, glossy.	Mezereum.

Bast tangentially striate, tough, whitish; periderm reddish; taste slightly acrid.	**Gossypium.**
Bast tangentially striate, tough, with yellow dots; cinnamon-brown; aromatic pungent.	Coto.
Bast tangentially striate, whitish; periderm gray and blackish, scaly; taste slightly acrid and bitter,	**Euonymus.**
Bast checkered, white or whitish; cork removed; sternutatory.	**Quillaia.**

Sect. 5. Mucilaginous.

Bast checkered, whitish or brownish; cork removed.	**Ulmus.**

Sect. 6. Aromatic (some also bitter) with oil or resin cells.

Astringent; compound quills; papery; outer surface lightest.	**Cinnamomum.**
Astringent; curved or quilled; both surfaces cinnamon-brown.	**Cinnamomum cassia.**
Astringent; flattish fragments, rust-brown; fracture corky.	**Sassafras.**
Bitterish, pungent; periderm whitish and reddish, with white scars; bast white.	**Canella.**
Bitterish, pungent; periderm brown, with dark-brown scars; bast brown.	**Cinnamodendron.**
Bitterish, pungent; periderm whitish or brown; inner surface ridged; contains tannin.	**Wintera.**
Very bitter; reddish-brown; in outer bark white striæ.	**Angustura.**
Very bitter; periderm white, fissured; inner surface brown.	**Cascarilla.**

CINCHONA.—CINCHONA, PERUVIAN BARK.

Origin.—Between 30 and 36 species of cinchona are usually recognized, of which number about one-half furnish commercial cinchona bark. O. Kuntze regards most of these as hybrids or as varieties, and recognizes only four typical species. Those recognized by the pharmacopœias are mentioned below.

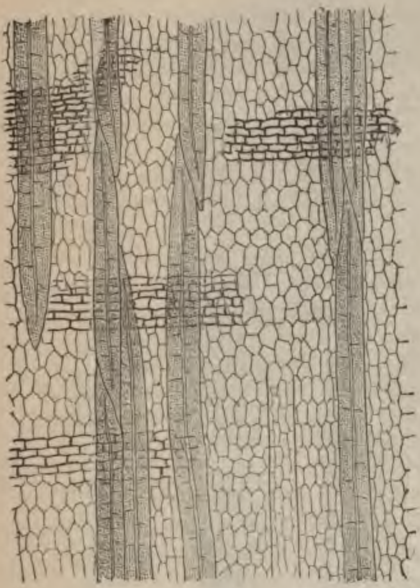
Natural order, Rubiaceæ, Cinchoneæ.

Habitat.—South America, commencing at 19° S. lat., on the eastern slope of the central chain of the Andes, northward to 2° S. lat., where a second belt commences on the eastern slope of the western chain; thence spreading northward into New Granada to 10° N. lat. The valuable species grow at an altitude of 1600 to 2400 meters (5300 to 8000 feet), Cinch. succirubra at 700 meters (2300 feet). Other species of little or no value are found up to 3500 meters (11,600 feet), and down to 100 meters (330 feet). The climate where the best species grow has a mean temperature of 12° to 13° C. (55° F.), and is damp and foggy throughout the greater part of the year.

Cinchonas are now extensively cultivated in Java, India (Neilgherry and Himalaya Mountains), Jamaica (Blue Mountains), and other countries; to a limited extent also in South America.

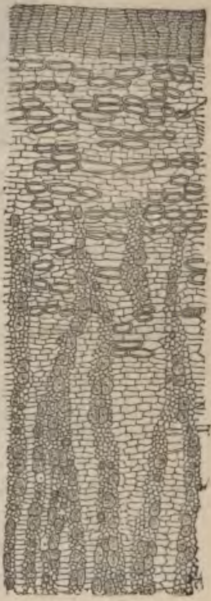
Structural Characteristics.—The bast fibres are rather short, obtusely pointed, unbranched, have very much thickened cell-walls and a minute cavity, and are quite brittle. They are imbedded in the bast parenchyme, either singly, or in short radial lines, composed of one or two rows, or in irregular groups of 2, 3, or sometimes 6 or 8 cells. The bast rays contain also incomplete fibres or staff cells, which are elongated and thick-walled. The primary bark of some species contains somewhat elongated unbranched laticiferous ducts (vessels, lacunæ) and thick-walled stone cells containing resin or crystals, which

Fig 104.



Calisaya bark.—Radial longitudinal section, showing bast fibres, bast parenchyme, and medullary rays.

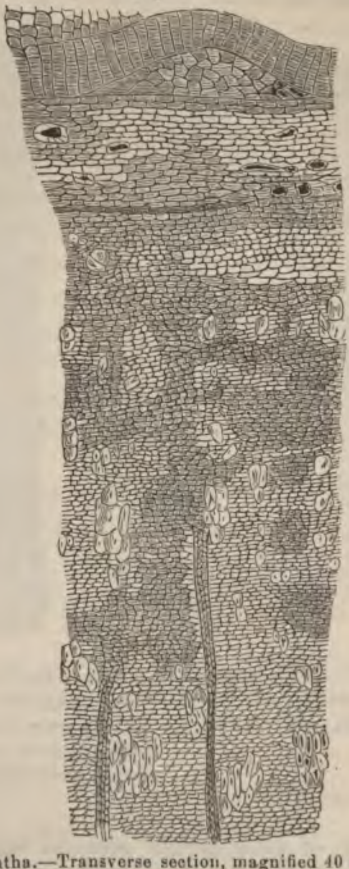
Fig. 105.



Cinchona lancifolia.—Transverse section, magnified 30 diam., showing numerous stone cells in outer bark and outer bast layer; bast cells in interrupted radial lines.

are also occasionally found in the medullary rays. The formation of secondary cork bands, penetrating deeply into the interior, causes the absence of these ducts and stone cells in the older trunk bark ot some species.

Fig 106.



Cinchona micrantha.—Transverse section, magnified 40 diam., few stone cells in outer bark; bast fibres single and in groups.

Classification of the Important Cinchona Barks.

1. Bast fibres single, sometimes in groups of 2 or rarely more, medium sized.
   - C. Calisaya. Laticiferous ducts in young bark; no or very few stone (resin) cells; old bark with prominent secondary cork; medullary rays narrow.
   - C. glandulifera. Laticiferous ducts in 1 or 2 rows; stone cells few; bast rays narrow; medullary rays large-celled.
2. Bast fibres single, or oftener in groups, not in distinct radial lines.
   - C. micrantha. No laticiferous ducts; stone cells few or none; bast fibres medium; medullary rays narrow.
   - C. purpurea. Laticiferous ducts in 1 or 2 rows; stone cells numerous; bast fibres medium, with some incomplete fibres; medullary rays broadly wedge-shaped at end.
   - C. pubescens. Laticiferous ducts in 1 row; stone cells numerous; bast fibres large, variable, with incomplete fibres; medullary rays broad.
3. Bast fibres in interrupted, single or double radial lines.
   - C. succirubra. Laticiferous ducts in 1 row, in old bark often filled with cells; stone cells none; bast and medullary rays narrow; bast fibres medium.
   - C. officinalis. Laticiferous ducts thin, soon obliterated; stone cells none; bast fibres medium; medullary rays narrow.
   - C. pitayensis. Laticiferous ducts none; stone cells few or none; bast fibres thin; medullary rays mostly narrow, wedge-shaped at end.
   - C. cordifolia. Laticiferous ducts none; stone cells few; bast fibres small, with some incomplete fibres; medullary rays large-celled.
   - C. lancifolia. Laticiferous ducts none; stone cells many; bast fibres medium, with some incomplete fibres; medullary rays large-celled.
   - C. nitida. Laticiferous ducts none; stone cells few or none; bast fibres mostly thin, but many thick or medium; medullary rays narrow.
   - C. peruviana. Laticiferous ducts (in 1 row) and stone cells small; bast fibres small, many incompletely filled.

4. Bast fibres in nearly uninterrupted radial lines.
   C. scrobiculata. Laticiferous ducts in 1 or 2 rows; stone cells and bast fibres numerous; medullary rays large-celled.

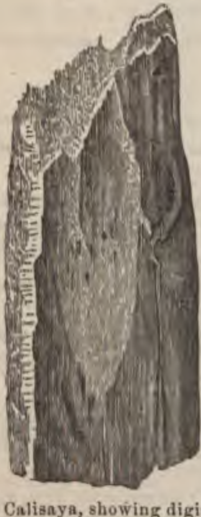
Officinal Cinchonas.

CINCHONA FLAVA.—YELLOW CINCHONA, CALISAYA BARK.

The bark of the trunk of Cinchona Calisaya, *Weddell.*

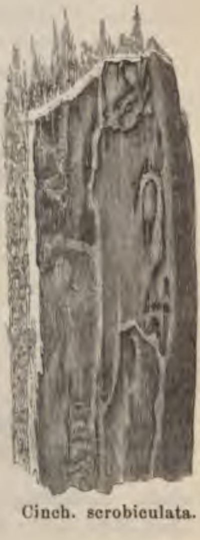
Habitat.—Northeastern Bolivia and Southeastern Peru. Altitude 1500–1800 meters (5000–6000 feet).

Fig. 107.



Cinch. Calisaya, showing digital furrow and short fibrous fracture.

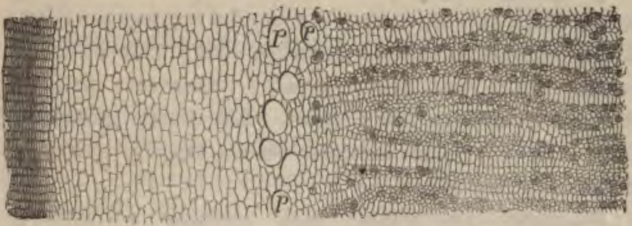
Fig. 108.



Cinch. scrobiculata.

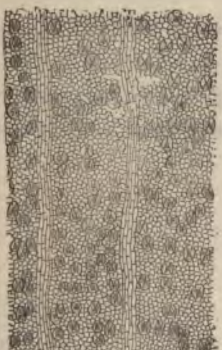
Description.—In quills or flat pieces; quills varying in size; bark 2 or 3 millimeters ($\frac{1}{12}$ or $\frac{1}{8}$ inch) thick, externally gray with fissures forming nearly square meshes with raised edges, internally yellowish, cinnamon-

Fig. 109.



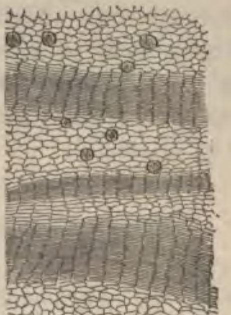
Calisaya bark, magnified 30 diam. quilled, with primary cork and near the bast rays, with laticiferous ducts.

Fig. 110.



Flat, inner layer; with narrow medullary rays and single bast fibres on radial lines.

Fig. 111.



Flat, outer layer; with bands of secondary cork and distant bast fibres.

colored; inner surface nearly smooth; fracture granular and short-fibrous. The flat pieces vary in length and width, and from 4 to 10 millimeters ($\frac{1}{6}$ to $\frac{2}{5}$ inch) in thickness; are almost completely deprived of the brown corky layer; compact; of a tawny-yellow color; outer surface marked with shallow conchoidal depressions (digital furrows) and intervening, rather sharp ridges; inner surface closely and finely striate; transverse fracture showing numerous, very short, and rigid, glistening fibres. Powder light cinnamon-brown, slightly aromatic, and persistently bitter.

Structure.—The young bark contains a layer of primary cork, no stone cells, and near the bast rays one or two circles of large laticiferous ducts. The flat bark consists of liber only, has the bast fibers singly or sometimes in pairs, arranged in radial lines, and contains bands of secondary cork.

Calisaya bark should not be confounded with other cinchona barks of a similar color, but having the bast fibres in bundles or radial rows, and breaking with a splintery or coarsely fibrous fracture (Cinch. scrobiculata and C. lancifolia).

CINCHONA PALLIDA.—Pale Cinchona, Loxa Bark, Crown Bark.

The bark of the branches of Cinchona officinalis, *Hooker*.

Habitat.—Ecuador, chiefly in the neighborhood of Loxa.

Description.—About 2 millimeters ($\frac{1}{12}$ inch) thick; in single or double quills from 3 to 20 millimeters ($\frac{1}{8}$ to $\frac{3}{4}$ inch) in diameter; outer surface brown or gray, often transversely fissured, and longitudinally wrinkled or nearly smooth; inner surface pale yellowish-brown or reddish-brown, finely striated; fracture slightly fibrous in the inner layer: powder pale brown, slightly odorous, astringent, and bitter.

Commercial Loxa bark is frequently mixed with the bark of one or several other species of Cinchona.

Structure.—Stone cells absent; the thin laticiferous ducts disappear in older bark; the bast fibres are placed in irregular interrupted lines of two to four.

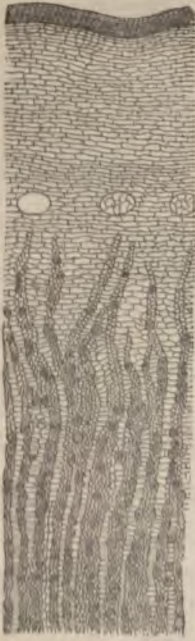
CINCHONA RUBRA.—Red Cinchona.

The bark of the trunk of Cinchona succirubra, *Pavon*.

Habitat.—Ecuador, west of Chimborazo. Altitude 700–1500 meters (2300–5000 feet).

Description.—Incurved pieces or quills, varying in length and width, and from 3 to 12 millimeters ($\frac{1}{8}$ to $\frac{1}{2}$ inch) thick; compact; of a deep brown-red color;

Fig. 112.



Cinchona succirubra. — Transverse section, magnified 30 diam.

outer surface covered with numerous suberous warts and ridges, or longitudinally and somewhat transversely fissured; inner surface rather coarsely striate; transverse fracture short-fibrous; powder deep brown-red, slightly odorous, astringent, and bitter.

Red cinchona should not be confounded with other Cinchona barks having an orange-red color and breaking with a coarse splintery fracture. Thin, quilled, red cinchona of a light red-brown color should be rejected.

Structure.—Stone cells absent; the large laticiferous ducts are frequently present in old bark and often filled with cells; the bast fibres are placed in interrupted lines of two to about eight.

Unofficinal Cinchona Barks.

Pitaya bark, from C. pitayensis, *Weddell.* Periderm smooth, ochre-colored, with circular scars; liber reddish cinnamon-brown; fracture short splintery; powder bright brown-yellow.

Cusco bark, from C. pubescens, *Vahl.* Periderm pale brown-yellow, warty, sometimes whitish; liber cinnamon-colored, with a coarse splintery fracture.

Carthagena bark, from C. lancifolia, *Mutis*, and C.

cordifolia, *Mutis*. Quills and half-quills; periderm whitish, ochre-colored or yellowish-brown, soft; inner surface cinnamon-brown, with orange or reddish tint; inner fracture fibrous.

Lima or Huanuco bark, from C. peruviana, *Howard*, C. nitida, *Ruiz et Pavon*, C. micrantha, *R. & P.*, and other species. Quills and half-quills, varying according to the origin.

Huamalies bark, from C. micrantha, *Ruiz et Pavon*, C. glandulifera, *R. & P.*, C. purpurea, *R. & P.*, and other species. Quills and half-quills, varying according to origin.

Jaen bark or false Loxa bark, from C. Humboldtiana, *Lambert*. Inferior.

Cinchona Pahudiana, *Howard*, formerly cultivated in Java. Bark of handsome appearance, but inferior.

Spurious Cinchona barks.—From different species of Ladenbergia, Exostemma, Nauclea, etc. The liber layer is more or less distinctly radially striate or checkered, and contains bast fibres with large cavity, variously arranged. Occasionally a bast fibre like those of the cinchonas is observed.

Cuprea bark or copper-colored cinchona from Remijia pedunculata, *Triana*, and R. Purdieana, *Weddell*, in Southern and Central Colombia. Quills or curved pieces, varying in length, about 6 millimeters (¼ inch) thick, of a dull copper-red color, with small patches of brownish color; hard, fracture coarsely granular. Cork consisting of thick-walled cells; primary bark with few scattered laticiferous ducts or free from the same, and like the liber, containing numerous stone cells; bast fibres with a rather large cavity and obtuse ends in close radial lines, which are most numerous in the outer bast layer. The bark contains about 2 or 3 per cent. of quinine, besides quinidine and cinchonine, but is free from cinchonidine; the alkaloid homoquinine, on being treated with potassa, yields quinine and cupreine, which is soluble in ether, and gives the thalleioquin color with chlorine and ammonia.

Constituents.—Kinic (quinic) acid, $C_7H_{12}O_6$ (5 to 7 per cent., yields kinone, $C_6H_4O_2$, with sulphuric acid and manganese binoxide); kinovic (quinovic) acid, $C_{24}H_{38}O_4$ (tasteless); kinovin (quinovin), $C_{30}H_{48}O_8$ (bitter; yields kinovic acid and mannitan); cinchotannic acid (usually 2 to 4 per cent.); cinchona red (derivative of the preceding); volatile oil (minute quantity), gum, sugar, wax, ash (2–3 per cent.). The most important constituents are the following five alkaloids: quinine and quinidine (conquinine), $C_{20}H_{24}N_2O_2$; cinchonine and cinchonidine, $C_{19}H_{22}N_2O$ (older formula, $C_{20}H_{24}N_2O$); quinamine, $C_{19}H_{24}N_2O_2$. Their properties are as follows:

		Soluble in parts of				
Alkaloids.	Rotation.	Water.	Alcohol.	Ether.	Cl and NH_3.	Cl, KCfo, and NH_3.
Quinine	left	167	6	23	green	dark red
Quinidine	right	2000	26	30	green	dark red
Cinchonine	right	3740	133	370	not gr.	not red
Cinchonidine	left	1680	20	76	not gr.	not red
Quinamine	right	trace	100	32	not gr.	not red

A large number of allied alkaloids have been obtained, some of which are known to be produced under the influence of heat or of reagents:

Isomeric with quinine are quinidine and quinicine.

Isomeric with quinamine are conquinamine, quinamidine, quinamicine

Isomeric with cinchonine are cinchonidine, cinchonicine, homocinchonine, homocinchonidine, homocinchonicine and apoquinamine.

In the preparation of the cinchona alkaloids a mother-liquor is obtained yielding a brown amorphous alkaloid known as chinoidine (quinidine), which is usually a mixture of dicinchonicine, $C_{38}H_{44}N_4O_2$ ($= 2C_{19}H_{22}N_2O$), and diconquinine (diquinidine), $C_{40}H_{46}N_4O_3$ ($= 2C_{20}H_{24}N_2O_2 - H_2O$); the latter gives with chlorine water and ammonia the green thalleioquin color.

Other alkaloids obtained from varieties of cinchona barks are—paricine, $C_{16}H_{18}N_2O$; paytine, $C_{21}H_{24}N_2O$; cusconine and aricine, $C_{23}H_{26}N_2O_4$.

Grahe's test. Barks containing cinchona alkaloids yield on dry distillation in a test-tube a purple-colored tar.

Properties.—Astringent, tonic, antiperiodic, febrifuge. *Dose*, 1 to 4 grams (gr. xv–ʒj), in powder, fluid extract, extract, or the salts of the alkaloids.

NECTANDRA.—Bebeeru. Greenheart Bark.

Origin.—Nectandra Rodiæi, *Schomburgk.* *Natural order*, Lauraceæ.

Habitat.—Guiana.

Description.—Flat pieces, 6 millimeters (¼ inch) or less thick; outer surface gray-brown, with numerous depressions; inner surface cinnamon-colored, coarsely striate; fracture granular from the numerous stone cells, in the liber somewhat tangentially striate; inodorous; taste astringent and bitter.

Constituents.—Bebirine, $C_{18}H_{21}NO_3$, identical with buxine and pelosine, white, soluble in ether; sipirine, red-brown, amorphous, insoluble in ether.

Properties.—Tonic, febrifuge, antiperiodic. *Dose*, 2 to 4 grams (ʒss–j), mostly the alkaloid, 0.06 to 0.6 gram (gr. j–x).

CORNUS.—Dogwood.

Origin.—Cornus florida, *Linné*. *Natural order*, Cornaceæ.

Habitat.—North America, in woods.

Description.—The bark of the root is collected and is deprived of the furrowed brown-gray corky layer; in curved pieces of various sizes, about 3 millimeters (⅛ inch) thick; outer and inner surface pale reddish or light reddish-brown, striate; transverse and longitudinal fracture short, whitish, with brown-yellow striæ of stone cells; inodorous; astringent and bitter.

Constituents.—Cornin (cornic acid, silky needles, bitter, soluble in water and alcohol), tannin (3 per cent.), resin, gum, etc.

Properties.—Astringent, tonic, febrifuge. *Dose*, 1 to 4 grams (gr. xv–ʒj), in decoction and fluid extract.

The bark of Cornus circinata, *L'Heritier*, or round-leaved dogwood, is thin, quilled, or curved; outer surface greenish or brownish-gray, with suberous warts or longitudinal lines; inner surface cinnamon-brown.

The bark of Cornus sericea, *Linné*, or swamp dogwood, is quilled, thin; outer surface purplish-brown or purplish-gray, with few suberous warts; inner surface cinnamon-brown.

These barks agree with that of Cornus florida in taste, constituents, and properties.

LIRIODENDRON.—Tulip-tree Bark.

Origin.—Liriodendron tulipifera, *Linné*. *Natural order*, Magnoliaceæ.

Habitat.—United States, in woodlands.

Description.—The bark of the branches is collected. Quills or curved pieces, about 2 millimeters ($\frac{1}{12}$ inch) thick; outer surface purplish-brown or blackish-gray, with thin, often cleft ridges forming elongated meshes; internally whitish, smooth; transverse fracture short, somewhat fibrous in the inner layer; nearly inodorous; taste somewhat astringent, pungent, and bitter. The bark of old wood deprived of the corky layer is whitish, fibrous, and less pungent.

Constituents.—Tannin, resin, gum, liriodendrin. The latter is in white, pungent, fusible needles or yellowish globules, soluble in alcohol and ether.

Properties.—Tonic, febrifuge, vermifuge. *Dose,* 4 to 8 grams (ʒj–ij), in infusion or fluid extract.

MAGNOLIA.—Magnolia.

Origin.—Magnolia glauca, *Linné,* M. acuminata, *Linné,* and M. tripetala, *Linné. Natural order,* Magnoliaceæ.

Habitat.—Middle and Southern United States.

Description.—Thin quills or curved pieces; periderm orange-brown, glossy, or light gray, with scattered warts, somewhat fissured; inner surface whitish or brownish, smooth; fracture in inner layer somewhat fibrous; inodorous; taste somewhat astringent, pungent, and bitter. The bark of old wood deprived of the corky layer is whitish or pale brownish, fibrous, and less pungent.

Constituents.—Tannin, soft pungent resin, magnolin. The latter is crystalline, of an irritating taste, insoluble in water, soluble in most simple solvents and in alkalies. The identity of the crystalline principles in the bark and fruit of the different species has not been demonstrated.

Properties.—Diaphoretic, tonic, febrifuge. *Dose,* 2 to 4 grams (ʒss–j), in decoction.

PRINOS.—Black Alder.

Origin.—Prinos verticillatus, *Linné*, s. Ilex verticillata, *Gray*. *Natural order*, Aquifoliaceæ.

Habitat.—North America, in swampy thickets.

Description.—Thin slender fragments, about 1 millimeter ($\frac{1}{25}$ inch) thick, fragile; outer surface brownish ash-colored, with whitish patches and blackish dots and lines, the corky layer easily separating from the green tissue; inner surface pale greenish or yellowish; fracture short, tangentially striate; nearly inodorous, bitter, slightly astringent,

Constituents.—Tannin, wax, fat, resin, chlorophyll albumen, sugar, gum, starch, amorphous bitter principle, which is precipitated by subacetate of lead.

Properties.—Astringent, tonic, alterative, febrifuge. *Dose*, 2 to 4 grams (ʒss–j), in decoction or fluid extract.

PRUNUS VIRGINIANA.—Wild Cherry Bark.

Origin.—The bark of Prunus (Cerasus, *Loiseleur*) serotina, *Ehrhart*. *Natural order*, Rosaceæ, Amygdaleæ.

Habitat.—North America, in woods.

Description.—Curved pieces or irregular fragments, 2 millimeters ($\frac{1}{12}$ inch) or more thick; outer surface greenish-brown or yellowish-brown, smooth, and somewhat glossy; if collected from old wood deprived of the corky layer, the outer surface rust-brown and uneven; inner surface somewhat striate, cinnamon-brown; brittle; fracture granular, radially striate; after maceration in water, of a distinct bitter almond odor; taste astringent, aromatic, and bitter.

It should be collected in autumn. The bark of the small branches is to be rejected.

Constituents —Tannin, gallic acid (?), bitter principle, resin, starch, amygdalin, emulsin. The reaction in water of the two last-named principles generates hydrocyanic acid and oil of bitter almond. Collected in October, the bark yields 0.144 per cent. HCy, contains a large percentage of tannin, and yields a dark-colored infusion. The bitter principle has not been completely isolated.

Properties.—Tonic, sedative, pectoral. *Dose*, 2 to 4 grams (ʒss–j), in infusion, syrup, or fluid extract.

BERBERIS.—Barberry Bark.

Cortex radicis berberidis.

Origin.—Berberis vulgaris, *Linné.* *Natural order*, Berberidaceæ.

Habitat.—Europe and Western Asia; naturalized in North America.

Description.—Thin fragments; periderm yellowish-gray, soft; inner surface smooth, orange-yellow; fracture short, bright yellow; separable in laminæ; inodorous; taste bitter, not astringent, tinging the saliva yellow.

Constituents.—Little tannin (green with ferric salts), wax, fat, resin, albumin, gum, starch, berberine 1¼ per cent. (see Hydrastis), berbine or oxyacanthine or vinetine —a bitter white alkaloid soluble in alcohol, ether, and chloroform.

Properties.—Tonic, febrifuge, in large doses laxative. *Dose*, 0.2 to 0.6 gram (gr. iij–x), in powder or decoction.

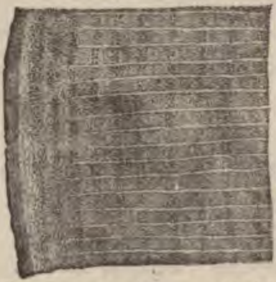
SALIX.—Willow.

Origin.—Salix alba, *Linné*, and other species of Salix. *Natural order*, Salicaceæ.

Habitat.—Europe, naturalized in North America; cultivated.

Description.—Collected from branches several years old. Fragments or quills, 1 or 2 millimeters ($\frac{1}{25}$ or $\frac{1}{12}$ inch) thick, smooth; outer surface somewhat glossy, brownish or yellowish, more or less finely warty, under the corky layer green; inner surface brownish-white, smooth; the liber separates in thin layers, and the transversely elongated liber bundles are accompanied by axial rows of crystal cells; inodorous, bitter, and astringent.

Fig. 113.



Salix.—Transverse section, magnified 15 diam.

Constituents.—Tannin, salicin, $C_{13}H_{18}O_7$, white bitter scales or needles, insoluble in ether, blood-red by sulphuric acid, by dilute acids split into sugar and saligenin, $C_7H_8O_2$ (solution blue by ferric chloride), or saliretin, $C_{14}H_{14}O_3$. The white or crack willows appear to contain more tannin, the purple willows more salicin. Salicin has also been found in the leaves and flowers of several species of willow.

Properties.—Tonic, astringent, vermifuge, febrifuge. *Dose*, 1 to 4 grams (gr. xv–ʒj) or more. Salicin as a tonic or febrifuge in doses of 0.2 to 1 gram (gr. iij–xv.)

VIBURNUM.—Viburnum, Black Haw.

Origin.—Viburnum prunifolium, *Linné*. *Natural order*, Caprifoliaceæ.

Habitat.—United States, in thickets.

Description.—The bark of the stem is in thin pieces or quills, glossy purplish-brown, with scattered warts and minute black dots; collected from old wood grayish-brown; the thin corky layer easily removed from the green layer; inner surface whitish, smooth; fracture short, inodorous, or of a slight valerian-like odor; taste somewhat astringent, bitter. The root bark is reddish-brown, internally cinnamon-colored, very bitter.

Constituents.—Valerianic acid, brown bitter resin, greenish-yellow bitter principle (viburnin), tannin, sugar, oxalates, citrates, malates, and ash 8–9 per cent.

Properties.—Diuretic, tonic, nervine; used in threatened abortion. *Dose*, 2 to 4 grams (ʒss–j), in infusion or fluid extract.

QUERCUS ALBA.—White Oak Bark.

Origin.—Quercus alba, *Linné*. *Natural order*, Cupuliferæ.

Habitat.—North America, in woods.

Description.—Nearly flat pieces, deprived of the corky layer, about 6 millimeters (¼ inch) thick, pale brown, inner surface with short, sharp, longitudinal ridges; tough; fracture coarsely fibrous, odor faint tan-like, taste strongly astringent; in the shops usually in an irregular fibrous powder, which does not tinge the saliva yellow.

Constituents.—Tannin, 6–11 per cent. (blue with ferric salts), red-brown coloring matter, pectin, resin, etc. Young oak bark is richer in tannin than bark from old wood. Querco-tannic acid is $C_{28}H_{24}O_{12}$ and $C_{28}H_{28}O_{14}$, the latter being readily soluble in water. Oak red is $C_{28}H_{22}O_{11}$.

Properties.—Astringent. *Dose*, 1 to 4 grams (gr. xv–ʒj); mostly used externally.

QUERCUS TINCTORIA.—BLACK OAK BARK.

Origin. — Quercus coccinea var. tinctoria, *Gray*. *Natural order*, Cupuliferæ.

Habitat.—North America, in woods.

Description.—Flattish pieces, deprived of the corky layer, about 5 millimeters (⅕ inch) thick, reddish-brown, inner surface somewhat ridged; compact but rather brittle; fracture coarsely fibrous; odor faint tan-like; taste strongly astringent and somewhat bitter, imparting a brownish-yellow color to the saliva. Usually kept in an irregular fibrous powder.

In the Southern States the barks of Quercus nigra, *Linné* (black jack), and of Qu. falcata, *Michaux* (Spanish oak), are frequently used as black oak bark; they are of a much coarser texture and of a deep reddish-brown color.

Constituents.—Tannin (blue with ferric salt), red-brown coloring matter, pectin, quercitrin, $C_{33}H_{30}O_{17}$. The latter is yellow, crystalline, nearly tasteless; nearly insoluble in cold water; colored dark green by ferric salts, and with dilute acids yields isodulcit, $C_6H_{14}O_6$, and yellow quercetin, $C_{27}H_{18}O_{12}$.

Properties and Uses.—Like the preceding.

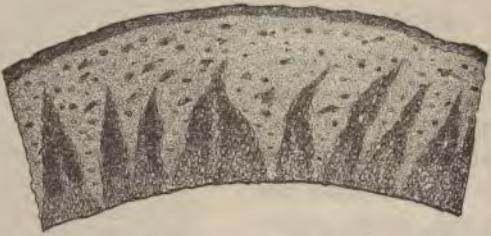
RUBUS.—BLACKBERRY BARK.

Origin.—Rubus villosus, *Aiton;* Rubus canadensis, *Linné;* and Rubus trivialis, *Michaux. Natural order*, Rosaceæ, Dryadeæ.

Habitat.—North America, in fields and thickets, the last-named species is confined to the Southern States.

Description.—The bark of the root is collected. Thin, tough, flexible bands, outer surface blackish or blackish-gray, inner surface pale brownish, sometimes with strips of whitish tasteless wood adhering, the bast fibres in transversely elongated groups, forming rather broad wedges; inodorous, strongly astringent, somewhat bitter.

Fig. 114.



Rubus villosus.—Transverse section of bark, magnified 15 diam

Constituents.—Tannin. No analysis.

Properties.—Astringent, tonic. *Dose*, 2 to 8 grams (ʒss–ij), in decoction, syrup, or fluid extract.

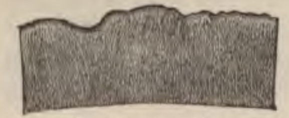
GRANATI RADICIS CORTEX.—BARK OF POMEGRANATE ROOT.

Origin.—Punica Granatum, *Linné*. *Natural order*, Granataceæ (Myrtaceæ, Granateæ).

Habitat.—India and Southwestern Asia; cultivated and naturalized in subtropical countries.

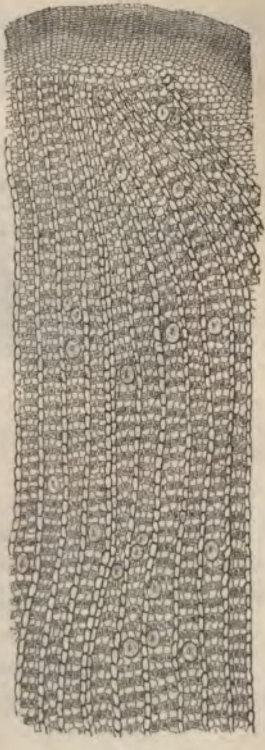
Description.—The bark of the root is collected. In thin quills or fragments, 5 to 10 centimeters (2 to 4 inches) long, little over 1 millimeter ($\frac{1}{25}$ inch) thick; outer surface brown or brown-gray, somewhat warty or longitudinally and reticulately ridged; inner surface smooth, finely striate, grayish-yellow; fracture short, granular, brownish-yellow, indistinctly radiate in the liber, which contains scattered stone cells and numerous transversely and axially packed cells with crystals of calcium oxalate; inodorous, scarcely bitter astringent.

Fig. 115.



Granati cortex. — Transverse section, magnified 10 diam.

Fig. 116.



Magnified 40 diam.

The bark of the stem is

similar, externally more gray, with broader suberous warts, the fracture greenish-yellow, and the bast layer more distinctly radiate; it is said to be fully equal to the root bark.

Constituents.—Punico-tannic acid, $C_{20}H_{16}O_{13}$, mannit, sugar, gum, pectin, pelletierine (colorless oily aromatic alkaloid, soluble in water), and three allied alkaloids; ash about 16 per cent.

Properties.—Anthelmintic, tænifuge. *Dose*, 8 to 16 grams (ʒij–iv), in decoction.

FRAXINUS.—White Ash.

Origin.—Fraxinus Americana, *Linné* (Fr. alba, *Marsh*). *Natural order*, Oleaceæ, Fraxineæ.

Habitat.—North America.

Description.—The bark of the root is preferred. Quills or curved pieces about 5 millimeters (⅕ inch) thick; cork warty, ash gray, often removed; whitish or yellowish; inner surface smooth; fracture coarsely fibrous, splintery; odor faintly aromatic, taste bitter, slightly acrid.

Constituents.—Volatile oil, alkaloid (not further examined), resin, starch, sugar, etc.

Properties.—Diuretic, emmenagogue. *Dose*, 1 gram (gr. xv).

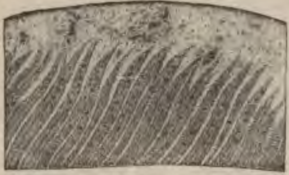
SIMARUBA.—Simaruba.

Origin.—1. Simarubra officinalis, *De Candolle;* and, 2. S. medicinalis, *Endlicher*. *Natural order*, Simarubaceæ.

Habitat.—1. Guiana to Northern Brazil. 2. West Indies.

Description.—The bark of the root is usually collected. Flattish, curved or quilled pieces, often 0.5 to 1 meter (20–40 inches) long, and 3 millimeters ($\frac{1}{8}$ inch) thick; periderm yellowish or brownish, often partly or wholly removed; then gray-brown; inner surface light brown, striate; bast coarsely fibrous, tough, flexible, difficult to break; bast rays wavy and oblique; inodorous; taste very bitter. No. 2 is light yellowish-brown, the inner surface finely striate.

Fig. 117.



Simaruba.—Transverse section, magnified 3 diam.

Constituents.—Probably quassin, some resin, trace of volatile oil, etc.

Properties.—Tonic, febrifuge. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in infusion or decoction.

QUASSIÆ CORTEX.—Quassia Bark.

Origin.—Picræna (Quassia, *Swartz*) excelsa, *Lindley*. *Natural order*, Simarubaceæ.

Habitat.—Jamaica.

Description.—Flat or curved pieces, about 5 millimeters ($\frac{1}{5}$ inch) or more thick; outer surface black-gray, longitudinally furrowed and verrucose; inner surface whitish, smooth; bast rays somewhat wavy; fracture in inner layer tough; inodorous, taste very bitter.

The bark of Quassia amara, *Linné*, or Surinam quassia, is about 1 millimeter ($\frac{1}{25}$ inch) thick; externally gray, smoothish; inner surface whitish, smooth; very brittle; fracture smooth.

Constituents.—Quassin, trace of volatile oil, etc.

Properties.—Tonic, febrifuge. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in infusion.

CONDURANGO.—CONDURANGO.

Origin.—Gonolobus Condurango, *Triana.* *Natural order*, Asclepiadaceæ.

Habitat.—Ecuador.

Description.—Quills or curved pieces; bark about 4 millimeters ($\frac{1}{6}$ inch) thick, externally brownish or brown-gray, wrinkled and warty; inner surface pale brownish; fracture granular, slightly fibrous, brown with wavy bast wedges and brownish-yellow groups of stone cells; nearly inodorous; taste bitter, somewhat acrid.

Constituents.—Bitter principle, tannin, resin, starch, gum, etc., ash about 12 per cent.

Properties.—Used in cancer and rheumatism. *Dose*, 2 grams (gr. xxx).

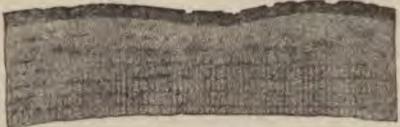
FRANGULA.—FRANGULA.

Origin.—Rhamnus Frangula, *Linné.* *Natural order*, Rhamnaceæ.

Habitat.—Europe and Northern Asia.

Description.—Quilled, about 1 millimeter ($\frac{1}{25}$ inch) thick; outer surface gray-brown or blackish-brown, with numerous small whitish transversely elongated suberous warts; inner surface smooth, pale brownish-yellow; fracture in the outer layer short, of a purplish tint; in the

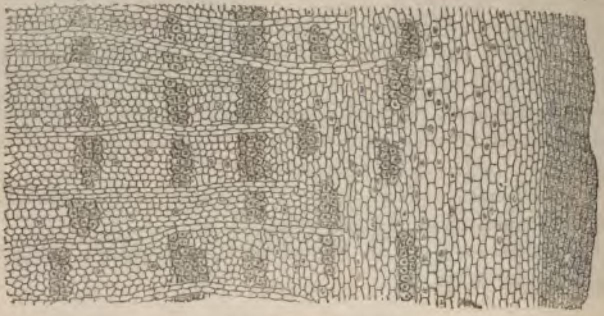
Fig. 118.



Frangula.—Transverse section, magnified 15 diam.

inner layer fibrous and pale yellow; bast bundles in tangential groups, accompanied by axial rows of cells containing crystals; nearly inodorous; taste sweetish and bitter. It should not be used sooner than a year after it has been collected.

Fig. 119.



Frangula.—Magnified 80 diam.

Constituents.—Frangulin or rhamnoxanthin, $C_{20}H_{20}O_{10}$ (yellow glucoside, tasteless, sublimable, purple by alkalies), emodin, bitter principle, resin, tannin, ash 5–6 per cent.

Properties.—When fresh, emetic; when old, tonic, purgative, diuretic. *Dose*, 2 to 8 grams (ʒss–ij), in decoction.

RHAMNUS PURSHIANA.—CASCARA SAGRADA, CHITTEM BARK.

Origin.—Rhamnus Purshiana, *De Candolle*. *Natural order*, Rhamnaceæ.

Habitat.—Rocky Mountains and westward to the Pacific coast.

Description.—Curved or quilled, 1 or 2 millimeters ($\frac{1}{25}$–$\frac{1}{12}$ inch) thick; periderm gray and whitish, underneath brown or reddish-brown; inner surface yellowish, smooth; fracture short, yellowish; inodorous; taste bitterish.

Constituents.—Tannin, white sublimable principle, and three resins, of which one is colored brown by potassa, another purple by the same reagent, and the third red-brown by sulphuric acid.

Properties.—Tonic, febrifuge, purgative. *Dose*, 1 to 4 grams (gr. xv–ʒj), in decoction, tincture, or fluid extract.

PISCIDIA.—JAMAICA DOGWOOD.

Origin.—Piscidia Erythrina, *Jacquin.* *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—West Indies.

Description.—In quills or curved pieces, 5 to 15 centimeters (2–6 inches) long, about 4 or sometimes 6 millimeters ($\frac{1}{6}$ or $\frac{1}{4}$ inch) thick, externally orange-brown or dark gray-brown, with thin longitudinal and transverse ridges, roughish wrinkled, somewhat fissured; inner surface brownish, smooth or fibrous; fracture tough, fibrous, with blue-green or brownish-green patches; bast fibres in tangentially elongated bundles, arranged in radial rows, attached to cells containing crystals of calcium oxalate and imbedded in parenchyme; odor narcotic, opium-like; taste bitter, somewhat acrid.

Constituents.—Resin, fat, and piscidin (crystallizable, insoluble in water, slightly soluble in cold alcohol, soluble in chloroform and benzol).

Properties.—Sudorific, soporific. *Dose*, 1 to 3 grams (gr xv–xlv).

JUGLANS.—BUTTERNUT.

Origin.—Juglans cinerea, *Linné.* *Natural order,* Juglandaceæ.

Habitat.—North America.

Description.—The inner bark of the root is collected in autumn. Flat or curved pieces, 3 to 6 millimeters (⅛ to ¼ inch) thick, outer surface nearly free from soft cork, deep brown; inner surface smooth and striate; transverse fracture short, delicately checkered from whitish parenchyme and transverse groups of brown bast fibres; odor feeble; taste bitter, somewhat acrid.

Constituents. — Nucin (juglandic acid, juglone), $C_{36}H_{12}O_{10}$ (orange-yellow needles, volatile, acrid, purple by alkalies), fixed oil 14 per cent., trace of volatile oil and tannin.

Properties.—Cathartic, tonic. *Dose,* 4 to 8 grams (ʒj–ij) in infusion or extract.

QUEBRACHO.—QUEBRACHO.

Quebracho blanco.

Origin.—Aspidosperma Quebracho, *Schlechtendal.* *Natural order*, Apocynaceæ.

Habitat.—Argentine Republic.

Description.—Nearly flat pieces, 1 to 3 centimeters (⅖–1⅕ inch) thick; cork deeply fissured, gray and internally reddish-brown; inner surface yellowish or brown; hard, fracture granular in the outer layer, showing wavy strata of cork and parenchyme, and short splintery in the yellowish or brown bast layer; the parenchyme with numerous whitish groups of stone cells; the bast fibres dark colored, scattered, and accompanied by axial rows of stone cells; nearly inodorous; taste very bitter, slightly aromatic.

Constituents.—Six alkaloids, viz., aspidospermine, quebrachine, quebrachamine, etc., little tannin.

Properties.—Tonic, antispasmodic in asthma, etc. *Dose*, 1 to 4 grams (gr. xv–ʒj).

Quebracho colorado (Loxopterygium Lorentzii, *Grisebach*). *Natural order*, Anacardiaceæ. This bark is neatly checkered from dark-colored cork-bands and light-colored medullary rays. The red-brown wood contains 20 per cent. of tannin.

AZEDARACH.—Azedarach.

Origin.—Melia Azedarach, *Linné. Natural order*, Meliaceæ.

Habitat.—China and India, cultivated in the Southern United States.

Description.—The bark of the root is collected. Curved pieces or quills of variable size and thickness, outer surface red-brown, with irregular blackish longitudinal ridges; inner surface whitish or brownish, longitudinally striate; fracture more or less fibrous; upon transverse section tangentially striate, with yellowish bast fibres; inodorous, sweetish, afterwards bitter and nauseous.

If collected from old roots, the bark must be freed from the thick rust-brown, nearly tasteless corky layer.

Constituents.—Bitter yellowish-white resin, soluble in alcohol, ether, and chloroform; no tannin.

Properties.—Anthelmintic, emetic, poisonous. *Dose*, 1 to 4 grams (gr. xv–ʒj), in decoction.

XANTHOXYLUM.—Prickly Ash.

Origin.—Xanthoxylum fraxineum, *Willdenow* (Northern prickly ash), and X. carolinianum, *Lambert* (Southern prickly ash). *Natural order*, Rutaceæ.

Habitat.—North America.

Description.—Northern prickly ash is in curved or quilled fragments, about 1 millimeter ($\frac{1}{25}$ inch) thick. outer surface brown-gray with whitish patches and minute black dots, faintly furrowed, with some brown, glossy, straight, two-edged spines, linear at the base, and about 6 millimeters long; inner surface whitish, smooth; fracture short, non-fibrous, green in the outer and yellowish in the inner layer; inodorous, bitterish, very pungent. Southern prickly ash resembles this, but is nearly 2 millimeters ($\frac{1}{12}$ inch) thick, and is marked by many conical corky projections, sometimes 2 centimeters ($\frac{4}{5}$ inch) high, and by stout brown spines, rising from a corky base.

Prickly ash should not be confounded with the bark of Aralia spinosa, *Linné*, which is nearly smooth externally and beset with slender prickles in transverse rows.

Constituents.—Acrid green oil, resin (crystalline, white, tasteless), soft resin (acrid), bitter principle (probably an alkaloid), little tannin, sugar, ash 12 per cent.

Properties.—Sialagogue, stimulant, alterative, emmenagogue. *Dose*, 0.5 to 1 gram (gr. viij–xv), in powder or tincture; large doses in decoction.

MYRICA.—BAYBERRY BARK.

Origin.—Myrica cerifera, *Linné.* *Natural order*, Myricaceæ.

Habitat.—North America.

Description.—Quills or curved pieces, about 1.5 millimeter ($\frac{1}{16}$ inch) thick; externally whitish or grayish, scaly; underneath the thin suberous layer smooth, red-brown; inner surface red-brown, faintly striate; fracture reddish, granular, slightly fibrous; odor somewhat aromatic; taste astringent, bitter, pungently acrid.

Constituents.—Acrid resin, myricinic acid (saponin (?), acrid, frothing with water), little volatile oil, tannin, etc.

Properties.—Acrid stimulant, sialagogue, errhine. *Dose*, 0.3 to 0.6 gram (gr. v–x).

ERYTHROPHLŒUM.—SASSY BARK.

Origin.—Erythrophlœum guineense, *Don.* *Natural order*, Leguminosæ, Mimoseæ.

Habitat.—Western and Central Africa.

Description.—Flat or curved, about 6 millimeters ($\frac{1}{4}$ inch) thick; externally warty, fissured, red-brown, hard; fracture coarsely granular and fibrous; inodorous, astringent, bitter and acrid.

Constituents.—Erythrophleine, tannin, coloring matter.

Properties.—Astringent, diaphoretic, narcotic.

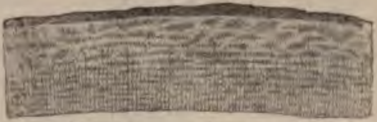
MEZEREUM.—MEZEREON.

Origin.—Daphne Mezereum, *Linné*, and other species of Daphne. *Natural order*, Thymelaceæ.

Habitat.—Europe, in mountainous regions.

Description.—Long, thin bands, folded or rolled into disks; outer surface yellowish or brown-yellow, with transverse scars and minute blackish dots, underneath of a light greenish color; inner surface whitish, silky; bast in irregular transverse layers, very tough, inodorous, very acrid.

Fig. 120.



Mezereum.—Transverse section, magnified 15 diam.

Constituents,—Soft acrid resin and oil; daphnin, $C_{31}H_{34}O_{19}$ (bitter glucoside, blue by ferric salts).

Properties.—Sialagogue, stimulant, diuretic, alterative; externally vesicant. *Dose*, 0.1 to 0.4 gram (gr. jss–vj), mostly combined with other drugs.

GOSSYPII RADICIS CORTEX.—BARK OF COTTON ROOT.

Origin.—Gossypium herbaceum, *Linné*, and other species of Gossypium. *Natural order*, Malvaceæ.

Habitat.—Subtropical Asia and Africa, cultivated in the United States.

Description.—The bark of the root is collected. Thin, flexible bands or quilled pieces; outer surface brownish-yellow, with slight longitudinal ridges or meshes, small black circular dots or short transverse lines, and, from the abrasion of the thin cork, with dull brownish-orange patches; inner surface whitish, of a silky lustre, finely striate; bast fibres long, tough, separable in papery layers; inodorous; taste very slightly acrid and faintly astringent.

Constituents.—In the fresh bark a yellow chromogene, becoming red and resinous; yellow resin, fixed oil, little tannin, sugar, starch, etc.

Properties.—Emmenagogue, oxytocic. *Dose*, 2 to 4 grams (ʒss–j), in decoction or fluid extract.

COTO.—Coto Bark.

Origin.—Unknown, probably from *natural order* Lauraceæ or Terebinthaceæ.

Habitat.—Bolivia.

Description.—Flat or curved, deprived of cork, about 6 to 12 millimeters ($\frac{1}{4}$–$\frac{1}{2}$ inch) thick; outer surface cinnamon-brown, smooth; inner surface darker brown; fracture granular in the outer layer, tenacious and fibrous in the inner layer, with numerous yellow stone cells and bast fibres; odor aromatic; cinnamon-like; taste pungent, slightly bitter.

Another coto (paracoto) bark is usually about 12 to 18 millimeters ($\frac{1}{2}$–$\frac{3}{4}$ inch) thick; sometimes with whitish fissured cork; odor fainter, nutmeg-like.

Constituents.—Cotoin, $C_{22}H_{18}O_6$ (pale yellow, very acrid), in coto bark. Paracotoin (pale yellow, tasteless); leucotin, etc., in paracoto bark. Both barks contain volatile oil and piperonylic acid, $C_8H_6O_4$; no tannin.

Properties.—Useful in diarrhœa. *Dose*, 0.3 to 0.6 gram (gr. v–x) in powder or tincture. *Dose*, of cotoin 0.05 to 0.10 gram ($\frac{3}{4}$–$1\frac{1}{2}$ gr.), of paracotoin 0.1 to 0.2 gram (gr. jss–iij).

EUONYMUS.—Wahoo.

Origin.—Euonymus atropurpureus, *Jacquin. Natural order*, Celastraceæ.

Habitat.—Northern and Middle United States, in shady woods.

Description.—Quilled or curved pieces, about 2 millimeters ($\frac{1}{12}$ inch) thick; outer surface ash-gray with blackish ridges or patches, detached in thin and small scales; inner surface whitish or slightly tawny, smooth; fracture smooth, whitish, the inner layers tangentially striate; nearly inodorous; taste sweetish, somewhat bitter, and acrid.

Constituents.—Euonymin (very bitter), resins, euonic acid, asparagin, starch, pectin.

Properties.—Tonic, diuretic, laxative, antiperiodic. *Dose*, 2 to 4 grams (℥ss–j), in decoction or fluid extract.

QUILLAIA.—Quillaia. Soapbark.

Origin.—Quillaia Saponaria, *Molina. Natural order*, Rosaceæ, Spiræ.

Habitat.—Chili and Peru.

Description.—The bark is deprived of the brown periderm. Flat large pieces, about 5 millimeters ($\frac{1}{5}$ inch) thick, pale brownish-white, and smooth on both sides, or the outer surface with small patches of brown cork; tough; fracture splintery; transverse section checkered, with tangentially arranged pale brownish bast fibres, white bast parenchyme, and distinct white medullary rays; inodorous, very acrid, sternutatory.

Constituents.—Saponin, $C_{32}H_{54}O_{18}$ (see Saponaria), numerous crystals of calcium sulphate, little starch.

Properties.—Stimulant, diuretic, irritant, detergent. *Dose*, 1 to 2 grams (gr. xv–xxx), in infusion.

ULMUS.—SLIPPERY ELM.

Origin.—Ulmus fulva, *Michaux.* *Natural order*, Urticaceæ, Ulmeæ.

Habitat.—North America, in woods.

Description.—The bark is deprived of the brown periderm. Flat pieces varying in length and width, about 3 millimeters ($\frac{1}{8}$ inch) thick, tough, pale brownish-white, the inner surface finely ridged; fracture fibrous and mealy; the transverse section delicately checkered; odor slight, fenugreek-like; taste mucilaginous, insipid.

European Elm bark from Ulmus campestris, *Linné*, and U. effusa, *Willdenow*, is cinnamon-colored, nearly inodorous, and of a mucilaginous, bitterish, and astringent taste.

Constituents.—Mucilage; in European Elm bark also a little tannin and bitter principle.

Properties.—Demulcent, emollient. *Dose*, 8 grams (ʒij) or more, mostly used externally.

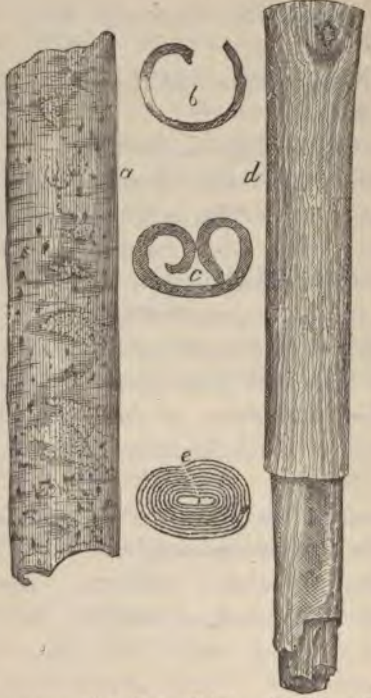
CINNAMOMUM.—CINNAMON. CEYLON CINNAMON.

Origin.—Cinnamomum zeylanicum, *Breyne.* *Natural order*, Lauraceæ.

Habitat.—Ceylon; cultivated.

Description.—The outer bark has been removed by scraping. In long closely rolled quills, composed of 8 or more layers of bark of the thickness of paper; pale yellowish-brown; outer surface smooth, formed by a layer of stone cells, and marked with wavy lines of bast bundles; inner surface scarcely striate; fracture splintery; the parenchyme contains starch and reddish-brown color-

Fig 121.



Cinnamon.—*a*, *b*, *c*. From China. *d*, *e*. From Ceylon.

ing matter, scattered oil cells and larger cells with mucilage; odor fragrant; taste sweet and warmly aromatic.

CINNAMOMUM CASSIA.—CINNAMON CASSIA. CHINESE CINNAMON.

Origin.—Cinnamomum Cassia, *Blume*, and other species of Cinnamomum. *Natural order*, Lauraceæ.

Habitat.—China.

Description.—Nearly deprived of the corky layer, 1 millimeter ($\frac{1}{25}$ inch) or more in thickness; yellowish-brown; more or less quilled; fracture nearly smooth; odor and taste analogous to that of cinnamon, but less delicate. The tissue resembles that of Ceylon cinnamon, but has the stone cells in irregular groups, and contains fewer bast-fibres and more mucilage cells.

Cassia lignea is either Chinese cinnamon, or a thicker, less fragrant, and more mucilaginous bark.

Saigon cinnamon from China is quilled, unscraped, sweet and fragrant.

Constituents.—Volatile oil ($\frac{1}{2}$ to 1 or $1\frac{1}{2}$ per cent.), tannin, sugar, mannit, mucilage, ash about 5 per cent. Oil of cinnamon has the spec. grav. 1.035–1.055 or 1.065, is readily soluble in alcohol, and consists of a hydrocarbon and of cinnamic aldehyd, C_9H_8O, which oxidizes to cinnamic acid, $C_9H_8O_2$. The oil of Ceylon cinnamon is most fragrant.

Properties. — Carminative, stimulant, astringent. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, tincture, or infusion.

SASSAFRAS.—Sassafras.

Origin.—Sassafras officinalis, *Nees.* *Natural order,* Lauraceæ.

Habitat.—North America, in woods.

Description.—The bark of the root is collected and deprived of the gray corky layer; irregular fragments, bright rust-brown, soft, brittle, with a short corky fracture showing numerous oil cells; strongly fragrant, sweetish, aromatic, somewhat astringent.

Constituents.—Volatile oil, tannin, sassafrid, starch, gum, resin, wax. Oil of sassafras has the spec. grav. 1.090, dissolves readily in alcohol, and yields with nitric acid a dark red resin—it consists of safrene, $C_{10}H_{16}$, and safrol, $C_{10}H_{10}O_2$.

Properties—Stimulant, diaphoretic, alterative. *Dose,* 2 to 4 grams (ʒss–j), in infusion; mostly used as flavor.

CANELLA.—Canella.

Origin.—Canella alba, *Murray.* *Natural order,* Canellaceæ.

Habitat.—West Indies.

Description.—In quills or broken pieces about 3 millimeters (⅛ inch) thick; almost completely deprived of the gray suberous layer; external surface pale orange-red, with transversely elongated cork scars and shallow, whitish depressions; inner surface white, finely striate; fracture short, granular, white, with numerous orange-yellow resin cells, and in the inner layer brownish; odor cinnamon-like; taste bitterish, biting.

Constituents.—Volatile oil 1 per cent. (contains eugenic acid), resin, bitter principle, mannit, mucilage, starch, albumen.

Properties.—Tonic, stimulant. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder and as an addition to tinctures.

CINNAMODENDRON.—FALSE WINTER'S BARK.

Origin—Cinnamodendron corticosum, *Miers*. *Natural order*, Canellaceæ.

Habitat.—Jamaica.

Description.—Curved or quilled, about 3 millimeters ($\frac{1}{8}$ inch) thick; deprived of the dark brown corky layer; outer surface smooth, light brown, with red-brown, roundish or transversely elongated scars; inner surface pale brown, finely striate; fracture short, granular, whitish and brownish, with numerous dark brown resin cells, and in the inner layer brown; odor cinnamon-like; taste bitterish, biting.

Constituents.—Probably like Canella.

Properties and Uses.—Like Canella.

WINTERA.—WINTER'S BARK.

Origin.—Drimys Winteri, *Forster*. *Natural order*, Magnoliaceæ, Wintereæ.

Habitat.—Western part of South America.

Description.—Quilled or curved, 2 to 8 millimeters ($\frac{1}{12}$ to $\frac{1}{3}$ inch) thick; outer surface gray and smooth, or rust-brown, and wrinkled; inner surface brown, coarsely striate or ridged; fracture granular, brown, with whitish stone cells and yellow resin cells; odor peculiar, aromatic; taste very pungent, astringent.

Constituents.—Volatile oil, tannin, pungent resin, starch.

Properties.—Tonic, stimulant, antiscorbutic. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder or tincture.

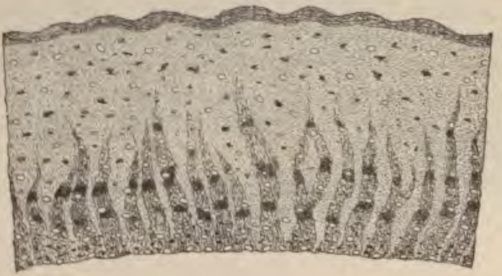
ANGUSTURA.—ANGUSTURA.

Origin.—Galipea Cusparia, *Saint Hilaire;* Gal. officinalis, *Hancock.* *Natural order*, Rutaceæ.

Habitat.—Northern South America.

Description.—Flat, curved, or quilled, 1 to 3 millimeters ($\frac{1}{12}$ to $\frac{1}{8}$ inch) thick; periderm ochrey-gray, friable, often partly or wholly absent, and the outer surface then reddish-brown; inner surface light cinnamon-brown, smooth; fracture smooth, resinous, reddish-brown, with scattered darker oil-cells and glistening white striæ (crystals of calcium oxalate); odor aromatic; taste aromatic, very bitter.

Fig. 122.



Angustura—Transverse section, magnified 10 diam.

Constituents.—Volatile oil $\frac{1}{5}$ to $\frac{1}{2}$ per cent., angosturine (crystallizable, bitter, green by oxidizing agents), cusparin (?), resins, gum, ash 8 per cent.

Esenbeckia febrifuga, *Martius*, so-called Brazilian angustura. Bark externally brown-gray or with light rust-brown patches, internally dark brown; fracture short fibrous; taste bitter, not aromatic. Contains evodine or esenbeckine (yellowish-green by H_2SO_4).

Properties.—Stimulant, tonic, febrifuge. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, iufusion, or tincture.

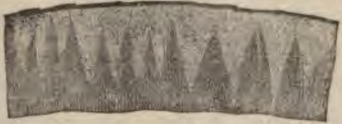
CASCARILLA.—Cascarilla.

Origin.—Croton Eluteria, *Bennett.* *Natural order,* Euphorbiaceæ.

Habitat.—Bahama Islands.

Description.—In quills or curved pieces, about 2 millimeters ($\frac{1}{12}$ inch) thick, having a grayish, somewhat fissured, easily detached corky layer, with white patches of a thin lichen and black dots; the remaining tissue dull brown, and the inner surface smooth; fracture short, resinous, radially striate; the parenchyme contains starch, and in scattered cells either oil, brown coloring matter, or crystals; bast fibres few; when burned emits a strong aromatic odor; taste warm and very bitter.

Fig. 123.



Cascarilla.—Transverse section, magnified 5 diam.

Constituents.—Volatile oil 1.5 per cent., cascarillin (soluble in alcohol, ether, and hot water), resin 15 per cent., little tannin, pectin, gum, starch.

Properties.—Stimulant, tonic, febrifuge, in large doses nauseating. *Dose,* 1 to 2 grams (gr. xv–xxx), in infusion or tincture.

Allied Drugs.—Copalchi bark, from Croton Pseudo-china, *Schlechtendal,* Mexico. Large quills; periderm whitish or gray, not fissured; inner surface cinnamon-brown, smooth; fracture granular, in inner layer finely fibrous; odor and taste similar to Cascarilla.

Malambo bark, from Croton Malambo, *Karsten,* Venezuela. Large quills, resembling the preceding, the thin cork longitudinally fissured, and easily removed.

Other barks from different species of Croton are not unfrequently sold for Copalchi and Malambo bark.

6. LEAVES AND LEAFLETS.—FOLIA ET FOLIOLA.

Leaves grow laterally from the stem, and are attached thereto either by the blade, in which case they are sessile, or they are petiolate, raised upon a foot-stalk. A leaf is called simple if it has only one blade, and compound if it has two or more distinct blades on a common leaf-stalk. The separate blades of compound leaves are termed leaflets, and, if they are articulated with the common leaf-stalk, they are, after collection and drying, usually detached from the latter, and cannot then be distinguished from simple leaves. The veins of a leaf may run parallel from the base to the apex, or from the midrib to the margin; or they may branch and divide in various ways and anastomose, forming a network. Parallel-veined leaves are met with in most monocotyledonous plants, while the dicotyledons have only netted-veined leaves, with the exception of the so-called phyllodia, which are foliaceous petioles. Deciduous leaves, which last only for a single season, are rarely leathery; but sempervirent leaves, lasting for more than one season, are generally of a leathery texture. All the officinal leaves are derived from dicotyledons.

Histology.—The petiole or foot-stalk consists of fibrovascular tissue, which, on entering the blade, branches so as to form the ribs and veins or framework of the leaf, the spaces between which are filled with parenchyme. Under the epidermis of the upper side of expanded leaves is found a layer consisting of one or more rows of vertically elongated, compacted parenchyme cells (palisade cells). The parenchyme between this layer and the lower surface is loosely arranged, leaving irregular air-spaces between the horizontally elongated cells. The parenchyme contains the chlorophyll. On the lower surface, and in some leaves also on the upper surface, are found the stomata or breathing-pores.

Classification.

I. Margin entire.

1. Aromatic and glandular; all coriaceous except Thymus.

Linear, revolute, woolly beneath, green above.	Rosmarinus.
Linear, revolute, pubescent beneath, grayish-green.	Thymus.
Broad oval, obtuse, rough on both sides.	Boldus.
Oval-oblong, retuse, uneven at base.	Pilocarpus.
Lance-oblong, acute at both ends.	Laurus.
Falcate-lanceolate, pointed, uneven at base.	Eucalyptus.
Oval-lanceolate or elliptic, smooth, delicately wrinkled.	Chekan.
Elliptic, smooth, reticulate above.	Myrcia
Oval-oblong, smooth, petiole winged.	Aurantium.

2. Not aromatic or glandular; coriaceous.

Linear-lanceolate, somewhat revolute, smooth.	Oleander.
Elliptic-oblong, revolute, rusty-woolly beneath, aromatic when bruised.	Ledum.
Obovate, somewhat revolute, smooth.	Uva ursi.
Ovate-oblong, rather acute, pale green.	Arctostaphylos glauca.
Roundish cordate, bristly.	Epigæa.
Elliptic, acute at both ends, smooth.	Kalmia.

3. Not aromatic or coriaceous.

Obovate, mucronulate, uneven at base, nearly smooth.	Senna (baladi).
Lance-oval, acute, uneven at base, nearly smooth.	Senna alexandrina.
Lanceolate, acute, uneven at base, nearly smooth.	Senna indica.
Ovate-oblong, obtuse, uneven at base, nearly smooth.	Cassia marilandica.
Lance-oblong, pointed, sometimes with a few teeth or three-lobed.	Sesamum.
Obovate-oblong, acute at base, near the midrib with two folds.	Erythroxylon.
Ovate-oblong, acute, papery and smooth, upper side mostly brownish.	Belladonna.
Oval-lanceolate, acute below, smooth.	Duboisia.
Ovate-lanceolate, acute, papery, hairy, brown on both sides.	Tabacum.

II. Margin toothed or crenate.

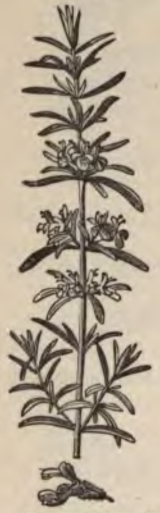
1. Not coriaceous.

Ovate, uneven at base, angular-toothed, papery, smooth.	Stramonium.
Ovate-oblong, gray-green, hairy, the teeth large and triangular.	Hyoscyamus.
Ovate, obtuse, crenate, beneath with white reticulations.	Digitalis.
Lanceolate, finely crenulate, beneath with brown reticulations.	Matico.
Ovate-oblong, finely crenulate, gray-green, soft hairy beneath.	Salvia.
Oval-obovate, obliquely heart-shaped, wavy-toothed.	Hamamelis.
Oval, acute at both ends, irregularly toothed, smooth.	Thea.
Lance-oblong, rather obtuse; teeth distant.	Ilex paraguayensis.
Obovate or lance-obovate, rather obtuse; teeth few.	Turnera.
Oblong-lanceolate, acuminate, sinuate serrate, smooth, feather-veined.	Castanea.
Lanceolate, pointed, closely serrate, smooth.	Persica.

Lance-oblong, with few teeth, mostly entire (see preceding).	Sesamum.
Roundish heart-shaped, angular; white tomentose beneath.	Tussilago.
2. Coriaceous.	
Oval, spiny-wavy toothed.	Ilex opaca.
Oblanceolate, sharply serrate above, green, and smooth.	Chimaphila.
Lanceolate, serrate, on upper surface a whitish spot.	Chimaphila maculata.
Roundish oval, mucronate, with appressed teeth, smooth.	Gaultheria.
Oblong, serrate, with depressed glands near base of midrib.	Laurocerasus.
Oval, obovate, or roundish, crenate or serrate, gland in each sinus.	Buchu (short).
Linear-lanceolate, rather thin, glandular like preceding.	Buchu (long).
Elliptic-lanceolate, dentate, varnished above, white and reticulate beneath.	Eriodictyon.
III. Margin lobed; subcoriaceous.	
Linear-lanceolate, lobes alternate, roundish.	Comptonia.
Kidney-shaped, three-lobed, lobes entire.	Hepatica.
Suborbicular, the divisions linear-lanceolate and furrowed above.	Aconitum.
IV. Leaves ternate.	
Leaflets sessile, obovate-oblong, slightly crenate.	Menyanthes.
Lateral leaflets sessile, obliquely ovate; all entire or notched.	Toxicodendron.
V. Leaves bi- or tri-pinnate.	
Pinnæ subcoriaceous, spatulate, nearly entire, pellucid-punctate.	Ruta.
Pinnæ thin, oblong-lanceolate, pointedly toothed.	Conium.

ROSMARINUS.—Rosemary.

Fig. 124.



Rosmarinus officinalis, ***Linné.*** **— Branch and flower.**

Origin. — Rosmarinus officinalis, *Linné. Natural order*, Labiatæ, Monardeæ.

Habitat.—Basin of the Mediterranean; cultivated.

Description.—Rigid, linear, about 25 millimeters (1 inch) long, entire, revolute, dark green above, woolly and glandular beneath, pungently aromatic, somewhat camphoraceous, and bitter.

Constituents.—Volatile oil about 1 per cent., resin, tannin, bitter principle. The volatile oil is yellowish, spec. grav. 0.90, readily soluble in alcohol, contains a hydrocarbon, $C_{10}O_{16}$, and stearopten, $C_{10}H_{16}O_2$.

Properties.—Carminative, stimulant, diuretic, emmenagogue, diaphoretic. *Dose*, 0.2 to 1 gram (gr. iij–xv), in infusion.

THYMUS.—Garden Thyme.

Origin.—Thymus vulgaris, *Linné. Natural order*, Labiatæ, Satureieæ.

Habitat.—Southern Europe; cultivated.

Description.—Linear or narrow oblong, about 5 millimeters (⅕ inch) long, revolute, grayish-green, glandular punctate on both sides, grayish pubescent beneath; aromatic; taste spicy.

Constituents.—Volatile oil about 2½ per cent., spec. grav. 0.89, readily soluble in alcohol, consists of cymene, $C_{10}H_{14}$, thymene, $C_{10}H_{16}$, and thymol, $C_{10}H_{14}O$; the latter melts at 50° C. (122° F.), and liquefies in contact with camphor.

Properties.—Carminative, tonic, emmenagogue, antispasmodic. *Dose,* 2 to 4 grams (ʒss–j), in infusion. Thymol externally as an antiseptic.

BOLDUS.—Boldo.

Origin. — Boldoa fragrans, *Ruiz & Pavon,* s. Peumus Boldus, *Molina. Natural order,* Monimiaceæ.

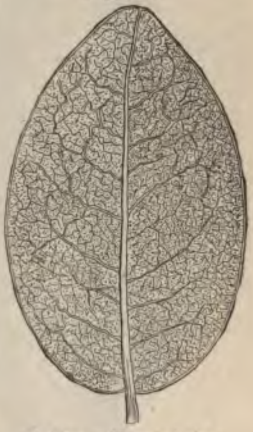
Habitat.—Chili; cultivated.

Description. — Broadly oval or oval-oblong, about 5 centimeters (2 inches) long, obtuse, rough on both sides, glossy above, hairy beneath, often reddish-brown, fragrant; taste pungent aromatic, somewhat bitter.

Constituents.—Volatile oil 2 per cent., boldine 0.1 per cent., glucoside 0.3 per cent., aromatic resin, tannin, etc.

Properties.—Tonic, stimulant. *Dose,* 1 to 4 grams (gr. xv–ʒj), in infusion or tincture.

Fig. 125.



Boldus.—Natural size.

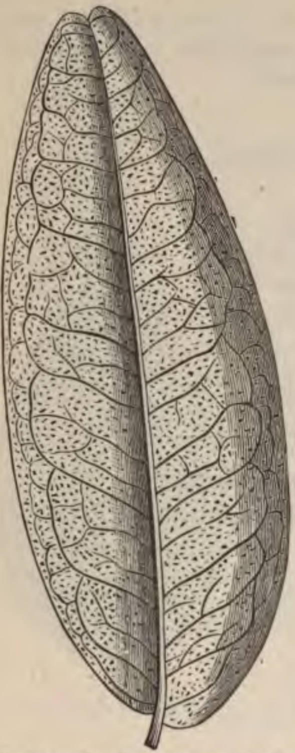
PILOCARPUS.—Jaborandi.

Origin.—Pilocarpus pennatifolius, *Lémaire. Natural order,* Rutaceæ, Xanthoxyleæ.

Habitat.—Brazil, near Pernambuco.

Description.—Leaves pinnate, with 5 to 11 leaflets, the terminal one nearly equal at base, the others short-stalked, oval or ovate-oblong, about 10 centimeters (4 inches) long, entire, and slightly revolute at the margin, near which the anastomosing veins form one or two distinct wavy lines; obtuse and emarginate; unequal at the base; coriaceous, pellucid-punctate, mostly smooth; when bruised, slightly aromatic, somewhat pungent, and bitter.

Fig. 126.



Pilocarpus.—Leaflet, natural size.

Constituents. — Volatile oil, pilocarpine, $C_{11}H_{16}N_2O_2$, $\frac{1}{4}$–$\frac{1}{2}$ per cent., amorphous, yields crystallizable salts. The volatile oil is chiefly pilocarpene, $C_{10}H_{16}$.

Properties.—Sialagogue, diaphoretic. *Dose,* 1 to 2 grams (gr. xv–xxx), in powder or tincture; pilocarpine 0.03 gram (gr. ss).

Other Jaborandis.—Aubletia trifolia, *Richard*, and Xanthoxylum elegans, *Engler*, of the natural order Rutaceæ. Serronia Jaborandi, *Gaudichaud* (contains crystalline jaborandine, $C_{10}H_{12}N_2O_3$), Piper reticulatum, *Linné*, P. nodulosum, *Link*, R. citrifolium, *Lamarck*, and Artanthe Mollicoma, *Miquel*, of the natural order Piperaceæ.

LAURAS.—LAUREL, BAY LEAVES.

Origin.—Laurus nobilis, *Linné. Natural order*, Lauraceæ.

Habitat.—Basin of the Mediterranean.

Description.—Oblong or lance-oblong, 5 to 10 centimeters (2 to 4 inches) long, acute at both ends, veined beneath, pellucid-punctate, brownish; aromatic, somewhat bitter.

Constituents.—Volatile oil, tannin, bitter principle.

Properties.—Stimulant, stomachic, astringent.

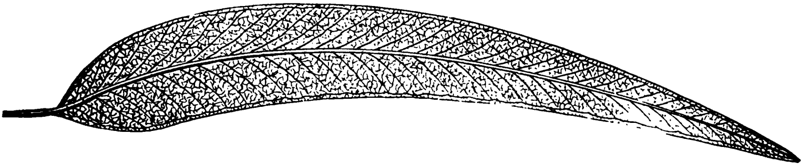
EUCALYPTUS.—EUCALYPTUS.

Origin.—Eucalyptus globulus, *Labillardière. Natural order*, Myrtaceæ.

Habitat.—Australia; cultivated in subtropical countries.

Description.—The leaves are collected from rather old trees. Petiolate, lanceolately scythe-shaped, 15 to 30 centimeters (6 to 12 inches) long, rounded and oblique below, tapering above, entire, leathery, gray-green,

Fig. 127.



Eucalyptus globulus, *Labillardière.*

glandular, feather-veined between the midrib and marginal veins; odor strongly balsamic; taste pungently aromatic, somewhat bitter, and astringent.

The leaves of young trees are broadly oval, obtuse, cordate at base, pale bluish-green, thinner, and less aromatic.

Constituents.—Volatile oil 6 per cent., tannin, cerylic alcohol, crystallizable fatty acid, crystallizable resin. The volatile oil contains cymol, $C_{10}H_{14}$, two terpenes, $C_{10}H_{16}$, and eucalyptol, $C_{10}H_{16}O$.

Properties.—Febrifuge, stimulant, astringent, antiseptic. *Dose*, 0.3 to 1 gram (gr. v–xv), in powder, infusion, tincture, or extract.

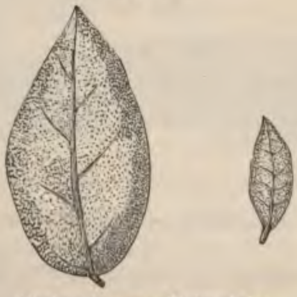
CHEKAN.—CHEKEN.

Origin.—Eugenia Chekan, *Molina.* *Natural order*, Myrtaceæ.

Habitat.—Chili.

Description.—Nearly sessile, oval-lanceolate or elliptic, about 25 millimeters (1 inch) long, somewhat revolute on

Fig. 128.



Cheken leaves.—Natural size.

the margin; light green, smooth, delicately wrinkled, pellucid-punctate, aromatic. Usually accompanied by the much-branched rough brown stems.

Constituents.—Volatile oil 2 per cent., alkaloid, tannin 4 per cent., ash 9 per cent.

Properties.—Stimulant, diuretic, antiseptic. *Dose*, 2 to 4 grams (ʒss–j).

MYRCIA.—Bay Leaves, Wild Clove Leaves.

Origin.—Myrcia acris, *De Candolle.* *Natural order*, Myrtaceæ.

Habitat.—West Indies.

Description.—Elliptic or broadly oval, 5 to 10 centimeters (2 to 4 inches) long, obtuse, reticulate, smooth, pellucid-punctate, aromatic, and spicy.

Constituents.—Volatile oil; it contains a hydrocarbon and eugenol.

Properties.—Stimulant, tonic; used for preparing the volatile oil and for bay rum.

AURANTII FOLIA.—Orange Leaves.

Origin.—Citrus vulgaris, *Risso.* *Natural order*, Aurantiaceæ.

Habitat.—Asia; cultivated in subtropical countries.

Description.—Oval- or ovate-oblong, 5 to 10 centimeters (2 to 4 inches) long, pointed, smooth, pellucid-punctate; petiole articulate, with a broad obovate or obcordate wing; aromatic, somewhat bitter.

The similar leaves of Citrus Aurantium, *Risso*, have the petioles narrow-winged or nearly naked.

Constituents.—Volatile oil, bitter principle.

Properties.—Stimulant, tonic.

OLEANDER.—Oleander.

Origin.—Nerium Oleander, *Linné*. *Natural order*, Apocynaceæ.

Habitat.—Basin of the Mediterranean; cultivated.

Description.—Nearly sessile, linear-lanceolate, 10 centimeters (4 inches) long, finely pointed, somewhat revolute, smooth, glossy above, feather-veined; inodorous, bitter, nauseous.

Constituents.—Oleandrine and pseudocurarine (two amorphous alkaloids), neriantin (glucoside).

Properties.—Sedative, poisonous.

LEDUM.—Labrador Tea.

Origin.—Ledum latifolium, *Aiton*. *Natural order*, Ericaceæ, Ericineæ.

Habitat.—Canada and Northern United States.

Description.—Elliptic oblong, about 3 centimeters (1⅕ inch) long, revolute, rounded or cordate at base, rusty woolly beneath; odor, when bruised, heavy; taste astringent, bitter, somewhat pungent.

Ledum palustre, *Linné*, Marsh tea, grows in the northern continents; leaves linear or lance-linear, otherwise like Ledum latifolium.

Constituents.—Tannin, volatile oil, ericolin, ericinol, resin, etc. (in L. palustre).

Properties.—Astringent, tonic, alterative, in large doses poisonous. *Dose*, 1 to 2 grams (gr. xv–xxx), in infusion.

UVA URSI.—Uva Ursi.

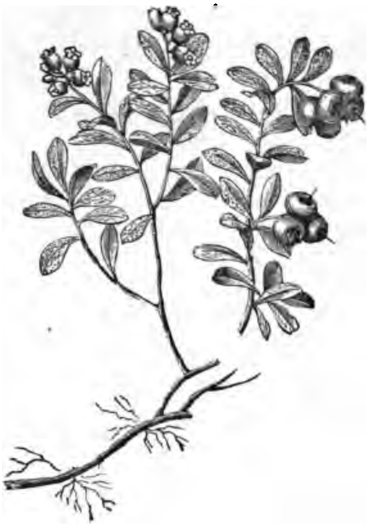
Origin.—Arctostaphylos Uva ursi, *Sprengel*. *Natural order*, Ericaceæ, Ericineæ.

Habitat.—Northern Hemisphere, in dry and sandy places.

Description.—Nearly sessile, obovate or oblong-spatulate, about 2 centimeters ($\frac{4}{5}$ inch) long, obtuse, slightly revolute on the margin, smooth, glossy on the upper surface, paler and reticulate on the lower surface; odor faint hay-like; taste strongly astringent, somewhat bitter.

Constituents.—Tannin, 6–7 per cent., gallic acid, arbutin, ericolin, ursone (tasteless crystals). Arbutin, $C_{24}H_{32}O_{14}$, bitter needles, soluble in alcohol and hot water; in alkaline solution azure-blue with phosphomolybdic acid; yields glucose and arctuvin, or hydrokinone. Ericolin, $C_{34}H_{56}O_{21}$, yellow, bitter, soluble in water and alcohol, yields glucose and ericinol (volatile oil).

Fig. 129.



Arctostaphylos Uva ursi, *Sprengel.*

Properties.—Astringent, tonic, diuretic, nephritic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in decoction or fluid extract.

ARCTOSTAPHYLOS GLAUCA.—MANZANITA.

Origin.—Arctostaphylos glauca, *Lindley*. *Natural order*, Ericaceæ, Ericineæ.

Habitat.—Mountains of California.

Description.—Petiolate, ovate-oblong, about 5 centimeters (2 inches) long, acute above, obtuse at base, glaucously pale green; inodorous, astringent and somewhat bitter.

Constituents, Properties, and Uses.—Like uva ursi.

EPIGÆA.—TRAILING ARBUTUS, GRAVEL PLANT.

Origin.—Epigæa repens, *Linné*. *Natural order*, Ericaceæ, Ericineæ.

Habitat.—North America, in sandy woods.

Description.—Ovate or suborbicular, cordate, about 5 centimeters (2 inches) long, reticulate, bristly; inodorous; taste astringent and bitter.

Constituents.—Tannin 3–4 per cent., acid resembling gallic acid, arbutin, ericolin, ursone.

Properties and Uses.—Like uva ursi.

KALMIA.—MOUNTAIN LAUREL.

Origin.—Kalmia latifolia, *Linné*. *Natural order*, Ericaceæ, Ericineæ.

Habitat.—North America, in damp or rocky woods.

Description.—Elliptic or lance-oval, 5 to 9 centimeters (2 to 3½ inches) long, acute at both ends, smooth and green on both sides; inodorous; taste astringent, bitter.

Constituents.—Tannin, arbutin, resin, etc.

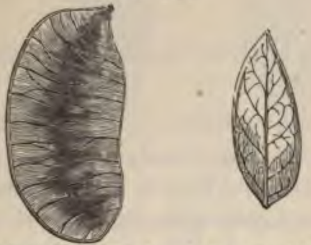
Properties.—Astringent, reputed to be poisonous.

SENNA ALEXANDRINA.—ALEXANDRIA SENNA.

Origin.—Cassia acutifolia, *Delile.* *Natural order*, Leguminosæ, Cæsalpinieæ.

Habitat.—Eastern and Central Africa.

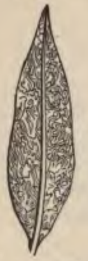
Fig. 130.



Cassia acutifolia, *Delile.*—Legume and leaflet.

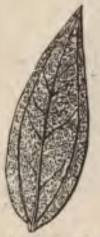
Description.—Leaves pinnate, with 8 or 10 leaflets, which are lanceolate or lance-oval, about 25 millimeters (1 inch) long, subcoriaceous, brittle, rather pointed, unequally oblique at the base, entire, grayish-green, nearly smooth; odor peculiar; taste nauseous, bitter.

Fig. 131



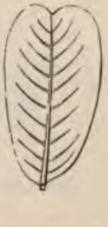
Argel leaf.

Fig. 132.



Coriaria leaf.

Fig. 133.



Tephrosia leaflet.

It should be free from stalks and legumes, but often contains argel leaves (from Solenostemma Argel, *Hayne*), which are thicker, one-veined, glaucous, and even at the base. The poisonous three-nerved leaves of Coriaria myrtifolia, *Linné*, have occasionally been mixed with senna; also the emarginate leaflets of Tephrosia appolinea, *De Candolle*.

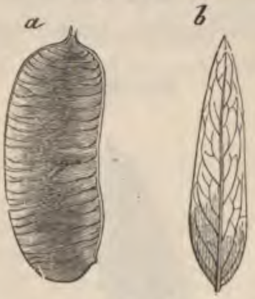
SENNA INDICA.—India Senna.

Origin.—Cassia elongata, *Lémaire-Lisancourt*. *Natural order*, Leguminosæ, Cæsalpinieæ.

Habitat.—Eastern Africa to India; cultivated.

Description.—Leaves pinnate, with 8 to 16 leaflets, which are lanceolate, nearly 5 centimeters (2 inches) long, acute, unequally oblique at the base, entire, dull green, slightly pubescent, of a peculiar odor, and a mucilaginous, bitter taste.

Fig. 134.

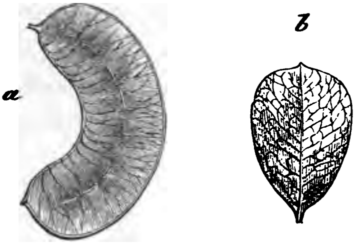


Cassia elongata, *Lém.*—*a.* Legume. *b.* Leaflet.

It should be free from stalks, discolored leaves, and other admixtures.

Varieties.—Alexandria senna sometimes consists in part of the leaflets of Cassia obovata, *Colladon,* known as Senna baladi or wild senna, which are obovate or obovate-oblong, mucronulate, rather longer than C. acutifolia, and are regarded as less efficacious.

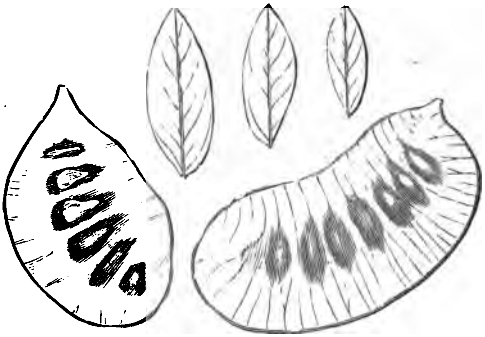
Fig. 135.



Cassia obovata, *Colladon.*—*a.* Legume. *b.* Leaflet.

Tripoli senna. Like Alexandria senna, leaflets more broken, free from argel leaves.

Fig. 136.



Tripoli senna.—Leaflets and legumes.

Tinnevelly senna, the cleanest variety of India senna, carefully dried and unbroken; from cultivated plants.

Bombay senna, an ordinary or inferior India senna, often mixed with discolored and small leaves.

Mecca senna, like the preceding, leaflets often brown, broken, and mixed with legumes.

Constituents. — Chrysophan, phæoretin, sennacrol, cathartic acid, sennit (cathartomannit), mucilage, etc. Cathartic acid is amorphous, black, nearly insoluble in water and alcohol, its alkaline and earthy salts soluble in water, and insoluble in alcohol; mineral acids split it into glucose and cathartogenic acid.

Properties.—Cathartic. *Dose*, 8 to 32 grams (ʒij–℥j), in infusion or fluid extract.

CASSIA MARILANDICA.—American Senna.

Origin.—Cassia marilandica, *Linné.* *Natural order*, Leguminosæ, Cæsalpinieæ.

Habitat.—United States, in low grounds.

Description.—Leaves pinnate, with 12 to 18 leaflets, which are ovate-oblong or elliptic, about 25 millimeters (1 inch) long, obtuse, uneven at base; odor and taste senna-like (but weaker), if collected in September and October.

Constituents.—Probably similar to senna. *Dose*, 16 to 50 grams (℥ss–jss), in infusion.

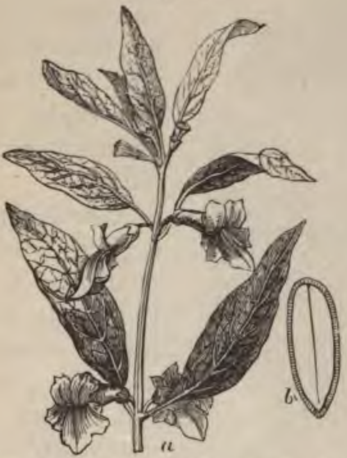
SESAMUM.—Benne.

Origin.—Sesamum indicum, *Linné.* *Natural order*, Pedaliaceæ.

Habitat.—India; cultivated.

Description.—Petiolate, ovate-oblong or oblong-lanceolate, pointed, rounded or somewhat heart-shaped at the base, entire, sometimes with a few teeth or two basa lobes, prominently veined, smoothish, mucilaginous. Used only in the fresh state.

Fig. 137.



Sesamum indicum, ***Linné.***—***a.*** **Flowering branch.** ***b.*** **Section of seed.**

Constituents.—Mucilage.

Properties.—Demulcent; used in infusion in dysentery, etc.

ERYTHROXYLON.—COCA.

Origin.—Erythroxylon Coca, *Lamarck.* *Natural order*, Erythroxylaceæ.

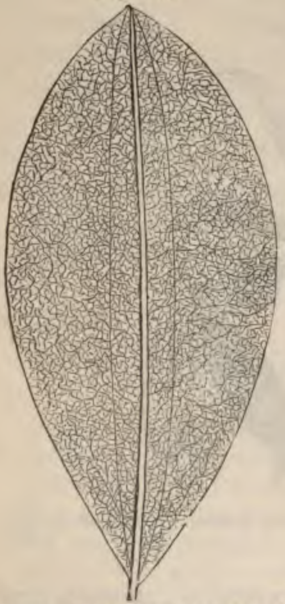
Habitat.—Peru, Bolivia; cultivated.

Description.—Oval or obovate-oblong, 50 to 75 millimeters (2 to 3 inches) long, short-petiolate, entire, rather obtuse or emarginate at apex, reticulate on both sides, with a prominent midrib, and on each side of it with a curved line (fold of the blade) running from base to apex; odor slight, tea-like; taste somewhat bitter and aromatic.

Constituents. — Cocaine, hygrine (volatile, oily), cocatannic acid. Cocaine, $C_{17}H_{21}NO_4$, colorless, bitter prisms, soluble in alcohol and ether, also in water; with strong HCl yields methylalcohol, benzoic acid, and ecgonine, which is sweetish, bitter, and insoluble in alcohol.

Properties. — Stimulant, diaphoretic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in substance, infusion, fluid extract; usually combined with an alkali.

Fig. 138.



Coca.—Lower surface, natural size.

BELLADONNÆ FOLIA.—Belladonna Leaves. Deadly Nightshade.

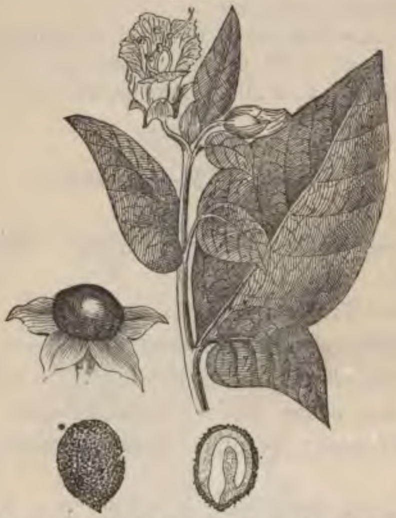
Origin.—Atropa Belladonna, *Linné.* *Natural order*, Solanaceæ.

Habitat.—Europe.

Description.—Ovate-oblong or broadly ovate, 10 to 15 centimeters (4 to 6 inches) long, narrowed into a petiole, tapering at the apex, entire, smooth, thin, upper surface brownish-green, lower surface grayish-green, of a slight odor, and of a bitterish, disagreeable taste.

Constituents.—Atropine 0.4 per cent. (the gold double salt at first oily, finally crystalline, without lustre), little hyoscyamine, belladonine (oxyatropine?) (see Belladonna root), mucilage, wax, albumen, asparagin (?), ash 14 per cent.

Fig. 139.



Atropa Belladonna, *Linné*.—Branch, fruit, seed, and section of seed, the last two magnified.

Properties.—Diuretic, dilating the pupil, narcotic. *Dose*, 0.03 to 0.2 gram (gr. ss–iij).

DUBOISIA.—Duboisia.

Origin.—Duboisia myoporoides, *R. Brown.* *Natural order*, Solanaceæ.

Habitat.—Australia.

Description.—Short-petiolate, lanceolate, about 7 centimeters (3 inches) long, narrowed at both ends, entire, smooth; inodorous, bitter.

Constituents—Duboisine (identical with hyoscyamine), volatile alkaloid, resin, etc.

Properties.—Similar to those of belladonna and hyoscyamus. *Dose*, 0.06 to 0.2 grams (gr. j–iij); of the alkaloid, 0.0005 to 0.001 gram (gr. $\frac{1}{120}$–$\frac{1}{60}$).

TABACUM—Tobacco.

Origin.—Nicotiana Tabacum, *Linné*. *Natural order*, Solanaceæ.

Habitat.—Tropical America; cultivated.

Description.—The commercial dried leaves are used. Oval or ovate-lanceolate, sometimes 50 centimeters (20 inches) long, acute, entire, brown, friable, glandular-hairy; odor heavy, peculiar; taste nauseous, bitter, and acrid.

Constituents.—Nicotine, $C_{10}H_{14}N_2$, 2 to 8, sometimes 11 per cent., nicotianin, resin, albumin, gum, extractive, ash 14 to 18, occasionally 27 per cent. Nicotine is colorless, becomes rapidly brown, is pungently acrid, soluble in water, alcohol, and ether.

Properties.—Diuretic, sedative, emetic, narcotic. *Dose*, 0.03 to 0.13 gram (gr. ss–ij); as emetic, 0.3 gram (gr. v), in powder, infusion, or wine; externally as sternutatory, enema, etc.

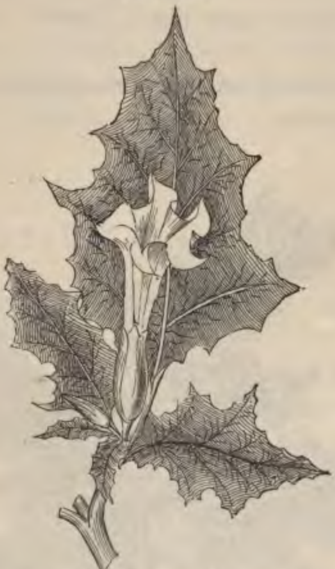
STRAMONII FOLIA.—Stramonium Leaves.

Origin.—Datura Stramonium, *Linné. Natural order*, Solanaceæ.

Habitat.—Asia; naturalized in most countries.

Description.—Petiolate, ovate, about 15 centimeters (6 inches) long, smooth, pointed, unequal at the base, coarsely and sinuately angular-toothed; after drying thin, brittle, and nearly inodorous; taste unpleasant, bitter, and nauseous.

Fig. 140.



Datura Stramonium, *Linné.*—Flowering branch.

Datura Tatula, *Linné*, is very similar, but has the foliage deeper green, and the stem and flowers purple colored.

Constituents.—Daturine 0.02 per cent., mucilage, albumen, ash 17 per cent. Daturine is a mixture of atropine and hyoscyamine, the latter usually predominating.

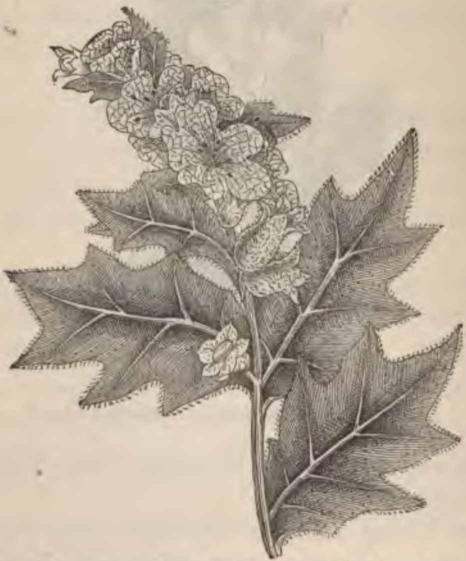
Properties.—Diuretic, dilating the pupil, narcotic. *Dose*, 0.06 to 0.13 gram (gr. j–ij), in powder or extract.

HYOSCYAMI FOLIA.—HYOSCYAMUS LEAVES. HENBANE.

Origin.—Hyoscyamus niger, *Linné.* *Natural order*, Solanaceæ.

Habitat.—Europe and Asia; naturalized in some parts of North America.

Fig. 141.



Hyoscyamus niger, *Linné.*—Flowering branch.

Description.—Ovate or ovate-oblong, sometimes 25 centimeters (10 inches) long, and 10 centimeters (4 inches) broad, sinuate-toothed, the teeth large, oblong or triangular; grayish-green, hairy; midrib prominent; odor heavy narcotic; taste bitter, somewhat acrid.

Constituents.—Hyoscyamine, $C_{17}H_{23}NO_3$ (the gold double salt is in lustrous yellow scales and does not melt under water); yields tropine and tropic acid, hyoscine (semi-liquid, isomeric with hyoscyamine, yields tropic acid and pseudo-tropine), hyoscypicrin, $C_{27}H_{52}O_{14}$, mucilage, albumin.

Properties.—Anodyne, hypnotic, dilates the pupil, narcotic. *Dose*, 0.13 to 0.6 gram (gr. ij–x), in powder, tincture, fluid extract, or extract.

DIGITALIS.—DIGITALIS, FOXGLOVE.

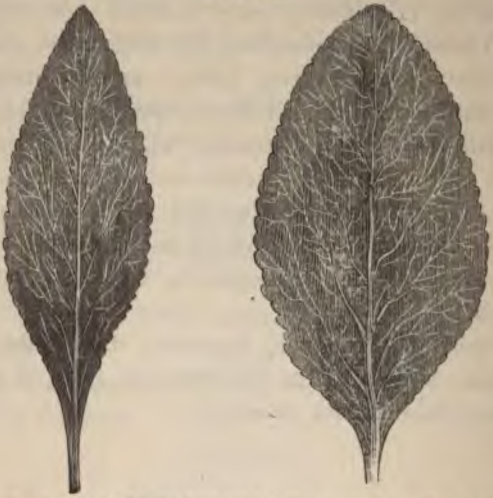
Origin.—Digitalis purpurea, *Linné. Natural order*, Scrophulariaceæ.

Habitat.—Europe, in sandy soil on the edges of woods.

Description.—The leaves are collected from plants of the second year's growth. Ovate-oblong, narrowed into a petiole; from 10 to 30 centimeters (4 to 12 inches) long; crenate, downy; dull green and wrinkled above; paler and whitish reticulate beneath; midrib near the base broad; odor faint, tea-like; taste bitter, nauseous.

Constituents.—Digitalin, resin, mucilage, extractive, inosit, pectin. The officinal digitalin is a mixture of several compounds, of which digitoxin is crystallizable, and by acids is converted into toxiresin.

Fig. 142.



Digitalis.—Leaf of the first and of the second year's growth.

Properties.—Diuretic, sedative, narcotic. *Dose*, 0.06 to 0.13 gram (gr. j–ij), in powder, infusion, tincture, or extract.

MATICO.—Matico.

Origin.—Artanthe elongata, *Miquel.* *Natural order*, Piperaceæ.

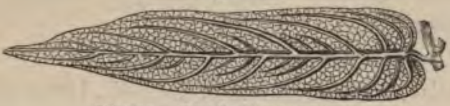
Habitat.—Tropical America.

Description.—Short-petiolate, oblong-lanceolate, 10 to 15 centimeters (4 to 6 inches) long, pointed, unequally heart-shaped, very finely crenulate, tessellated above, reticulate and rough beneath, the meshes small, and the veins densely brownish-hairy; aromatic, spicy, and bitterish.

The leaves of Artanthe adunca are not tessellated, rough, and hairy like true matico.

Constituents.—Volatile oil 1½ per cent., pungent resin, artanthic acid (crystalline), tannin, mucilage, etc.

Fig. 143.



Matico.—One-half natural size.

Properties.—Stimulant, tonic, vulnerary, styptic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in powder, infusion, or extract; also externally as a styptic.

SALVIA.—SAGE.

Origin.—Salvia officinalis, *Linné.* *Natural order*, Labiatæ, Monardeæ.

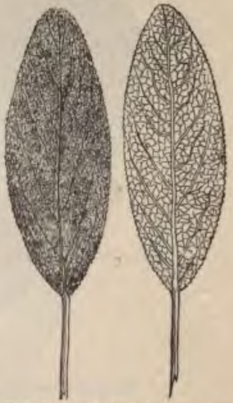
Habitat.—Southern Europe; cultivated.

Description.—Petiolate, ovate-oblong, about 5 centimeters (2 inches) long, obtuse, finely crenulate, thickish, wrinkled, grayish-green, and beneath soft hairy and glandular; aromatic, bitterish, somewhat astringent.

Constituents.—Volatile oil ½–¾ per cent., resin, tannin, albumin, extractive, etc. The volatile oil is of spec. grav. 0.88, freely soluble in alcohol, and contains a terpene and salviol, $C_{10}H_{18}O$.

Properties.—Stimulant, tonic, astringent, vulnerary. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion; externally as a gargle, etc.

Fig. 144.



Salvia.—Natural size, upper and lower surface.

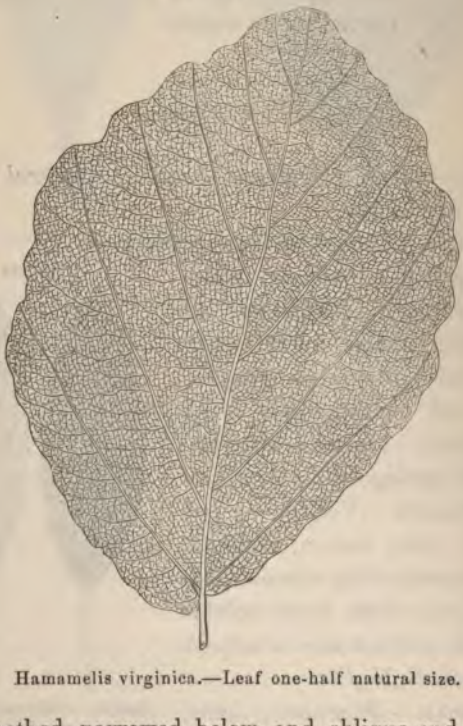
HAMAMELIS.—HAMAMELIS. WITCH HAZEL.

Origin.—Hamamelis virginica, *Linné.* *Natural order*, Hamamelaceæ.

Habitat.—North America, in thickets.

Description.—Short-petiolate, thickish, 10 to 15 centimeters (4–6 inches) long, obovate or oval-obovate, obtuse, wavy-toothed, narrowed below, and oblique and slightly heart-shaped at base, feather-veined, nearly smooth, inodorous, taste astringent and bitter.

Fig. 145.



Hamamelis virginica.—Leaf one-half natural size.

Constituents.—Tannin and bitter principle.

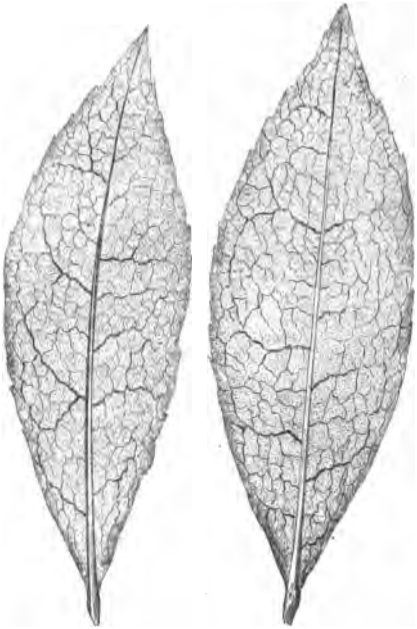
Properties.—Tonic, astringent, somewhat sedative; externally in skin diseases. *Dose*, about 4 grams (ʒj), in decoction or fluid extract.

THEA.—TEA.

Origin.—Thea chinensis, *Sims*, s. Camellia Thea, *Link*. *Natural order*, Ternstrœmiaceæ (Camelliaceæ).

Habitat.—Southeastern Asia; cultivated.

Fig. 146.



Tea leaves.—Natural size.

Description.—Short-petiolate, oval or oblanceolate, 25 to 50 or 75 millimeters (1 to 2 or 3 inches) long, acute at both ends, or obtuse above, irregularly serrate, the lateral veins anastomosing near the margin; smooth or the veins somewhat pubescent; odor agreeable, peculiar; taste pleasantly astringent and bitterish. In commerce the leaves are rolled; bluish-green or blackish.

Adulterations with other leaves are recognized by the shape, the character of the venation, and the serratures on the margin.

Constituents.—Volatile oil 0.6–1 per cent., theine (identical with caffeine) 1½–4 per cent., boheic acid, albumin, wax, resin, ash 4–6 per cent., containing about 14 per cent. of phosphoric acid.

Properties.—Astringent, tonic, stimulant, nervine. *Dose*, 2 to 8 grams (ʒss–ij), in infusion.

ILEX PARAGUAYENSIS.—MATÉ, PARAGUAY TEA.

Origin.—Ilex paraguayensis, *Lambert. Natural order*, Aquifoliaceæ.

Habitat.—Brazil and Argentine Republic.

Description.—Short-petiolate, lance-oblong, about 5 centimeters (2 inches) long, nearly obtuse, margin few-toothed; smooth; odor slight; taste astringent and bitterish. The commercial maté consists of the slightly torrefied leaves, reduced to coarse powder.

Constituents.—Tannin 10–16 per cent., caffeine 0.2–1.6 per cent., little volatile oil and stearopten.

Properties and Dose.—Like Thea.

TURNERA.—DAMIANA.

Origin.—Turnera microphylla, *De Candolle. Natural order*, Turneraceæ.

Habitat.—Mexico.

Description.—Short-petiolate, obovate or lance-obovate, about 25 millimeters (1 inch) long, rather obtuse, with a wedge-shaped base and few-toothed margin, light green, nearly smooth, somewhat aromatic. The much-branched stems and pentamerous yellow flowers are sometimes present.

Fig. 147.

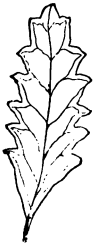


Fig. 148.

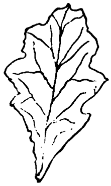
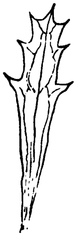


Fig. 149.



Figs. 147, 148.—Turnera leaves.—Natural size.
Fig. 149.—Aplopappus leaf.—Natural size.

Aplopappus discoideus, *De Candolle*, False damiana. *Natural order*, Compositæ. Leaves lanceolate or oblanceolate, acute, 1- to 3-toothed on each side, roughish and minutely dotted; involucre of flower-heads imbricate, florets yellow, pappus hairy.

Constituents.—Volatile oil, resin, bitter principle, tannin.

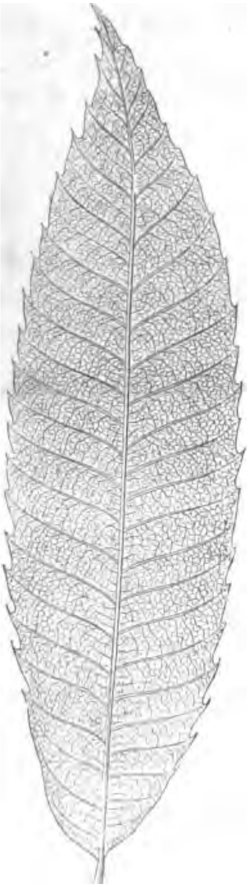
Properties.—Stimulant, tonic, laxative. *Dose*, 2 grams (gr. xxx) in fluid extract.

CASTANEA.—CHESTNUT LEAVES.

Origin.—Castanea vesca, *Gærtner*. *Natural order*, Cupuliferæ.

Description.—From 15 to 25 centimeters (6 to 10 inches) long, about 5 centimeters (2 inches) wide, petiolate, oblong-lanceolate, acuminate, mucronate, feather-veined, sinuate serrate, smooth, of a slight odor, and a somewhat astringent taste.

Fig. 150.



Castanea.—Leaf one-half natural size.

They should be collected in September or October, while still green.

Constituents.—Tannin, etc.

Properties.—Tonic, mild sedative. *Dose*, 2 to 8 grams (ʒss–ij), in infusion or fluid extract, in whooping-cough.

PERSICA.—PEACH LEAVES.

Origin.—Persica vulgaris, *De Candolle. Natural order*, Rosaceæ, Amygdaleæ.

Habitat.—Levant; cultivated.

Description.—Short-petiolate, lanceolate, about 10 centimeters (4 inches) long, pointed, closely serrate, smooth; odor slight, in infusion bitter-almond-like; taste taste bitter.

Constituents.—Amygdalin, tannin.

Properties.—Mild sedative, tonic. *Dose*, 2 grams (gr. xxx) in infusion.

TUSSILAGO.—COLTSFOOT.

Origin.—Tussilago Farfara, *Linné. Natural order*, Compositæ, Eupatorieæ.

Habitat.—Northern Asia and Europe, naturalized in the United States.

Description.—Long-petiolate, roundish heart-shaped, about 10 centimeters (4 inches) in diameter, angular-toothed, smooth and green above, white tomentose beneath; inodorous; taste mucilaginous, bitterish and slightly astringent.

Constituents.—Mucilage, bitter principle, tannin.

Properties.—Demulcent, tonic. *Dose*, 2 to 4 grams (ʒss–j) in decoction.

ILEX OPACA.—Holly.

Origin.—Ilex opaca, *Aiton.* *Natural order*, Aquifoliaceæ.

Habitat.—United States.

Description.—Petiolate, oval, about 5 centimeters (2 inches) long, spinous wavy-toothed, coriaceous, smooth, inodorous; taste mucilaginous, bitterish, astringent.

Constituents.—Bitter principle, tannin.

Properties.—Demulcent, tonic, emetic. *Dose*, 1 to 2 grams (gr. xv–xxx).

CHIMAPHILA.—Pipsissewa, Prince's Pine.

Origin.—Chimaphila umbellata, *Nuttall.* *Natural order*, Ericaceæ, Pyroleæ.

Habitat.—Northern continents.

Description.—Oblanceolate, about 5 centimeters (2 inches) long, sharply serrate above, wedge-shaped and nearly entire towards the base; coriaceous, smooth, dark green on upper surface; nearly inodorous, and of an astringent and bitterish taste.

The leaves of the spotted pipsissewa, Chim. maculata, *Pursh*, indigenous to North America, are lanceolate or ovate-lanceolate, about 5 centimeters (2 inches) long, serrate, and upon the upper surface variegated with white.

Constituents.—Arbutin, ericolin, urson, tannin 4 per cent., chimaphilin (yellow, tasteless, volatile prisms), sugar, gum, ash 5 per cent.

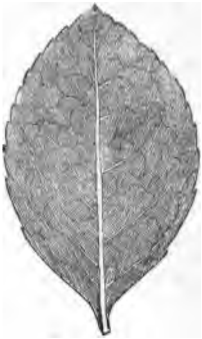
Properties.—Astringent, tonic, diuretic, nephritic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in decoction or fluid extract.

GAULTHERIA.—Gaultheria, Wintergreen.

Origin.—Gaultheria procumbens, *Linné.* *Natural order*, Ericaceæ Ericineæ.

Description.—Short-petiolate, obovate or roundish-oval, about 4 centimeters (1⅗ inch) long, and 2 centimeters (⅘ inch) or more broad, mucronate, slightly serrate with appressed teeth, coriaceous, smooth, glossy-green above, paler beneath; fragrant; taste aromatic and astringent.

Fig. 151.



Gaultheria.—Natural size.

Constituents.—Volatile oil, arbutin, ericolin, urson, tannin, sugar, gum, etc. The volatile oil is of spec. grav. 1.17, readily soluble in alcohol, colored dark purple by ferric chloride in alcoholic solution, and with nitric acid yields colorless prisms; it consists of gaultherilene, $C_{10}H_{16}$, and mainly of methyl salicylate, $CH_3.C_7H_5O_3$.

Properties.—Stimulant, astringent, diuretic, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

LAUROCERASUS.—Cherry Laurel.

Origin.—Prunus (Cerasus, *Loiseleur*) Laurocerasus, *Linné.* *Natural order*, Rosaceæ, Amygdaleæ.

Habitat.—Western Asia; cultivated in Southern Europe.

Description.—Short-petiolate, oblong or oblong-lanceolate, acute, somewhat revolute, distantly sharply serrate, underneath near the base one to three pairs of depressed glands; odor (when bruised) bitter-almond-like; taste aromatic, bitter.

Constituents.—Compound of amygdalin (?), emulsin, bitter principle, tannin, sugar, gum; after bruising and macerating in water, yield hydrocyanic acid and volatile oil, consisting of benzaldehyd, C_7H_6O.

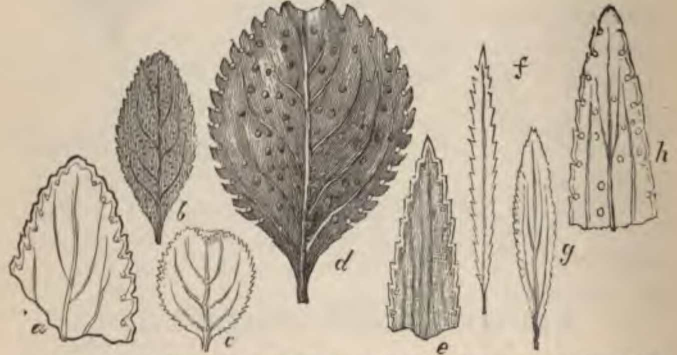
Properties.—Sedative; used for making cherry-laurel water.

BUCHU.—Buchu.

Origin.—Barosma betulina, *Bartling*, Bar. crenulata, *Hooker*, and Bar. serratifolia, *Willdenow*. *Natural order*, Rutaceæ.

Habitat.—Southern Africa.

Fig. 152.



Buchu.—*a*, *b*. Barosma crenulata, *Hooker*. *c*, *d*. Bar. betulina, *Bartling*. *g*, *h*. Bar. serratifolia, *Willdenow*. *e*, *f*. Empleurum serrulatum, *Aiton*. *b*, *c*, *f*, *g*, natural size.

Description.—Roundish-obovate, with a rather wedge-shaped base (B. betulina), or varying between oval and obovate (B. crenulata), about 2 to 3 centimeters (⅘–1⅕ inch) long, obtuse, crenate or serrate, with a gland at the base of each tooth, pale green, thickish, pellucid-punctate; strongly aromatic, somewhat mint-like, pungent, and bitterish.

The leaves of Bar. serratifolia are about 3 to 4 centimeters (1⅕–1⅗ inch) long, thinner, linear-lanceolate, obtuse—otherwise like the preceding.

Varieties.—Short buchu from B. betulina and B. crenulata; long buchu from B. serratifolia. The latter are sometimes mixed with the very similar leaves of Empleurum serrulatum, *Aiton* (*Natural order*, Rutaceæ), which are narrow linear, and, at the apex, acute and glandless.

Constituents.—Volatile oil (1–1.6 per cent. from short, 0.66 from long buchu; the stearopten diosphenol, is colored black-green by ferric salts), resin, mucilage, bitter principle, rutin (?), etc.

Properties.—Stimulant, tonic, diuretic. *Dose*, 1 to 2 grams (gr. xv–xxx), in infusion or fluid extract.

ERIODICTYON.—MOUNTAIN BALM.

Origin.—Eriodictyon californicum, *Bentham*. *Natural order*, Hydrophyllaceæ.

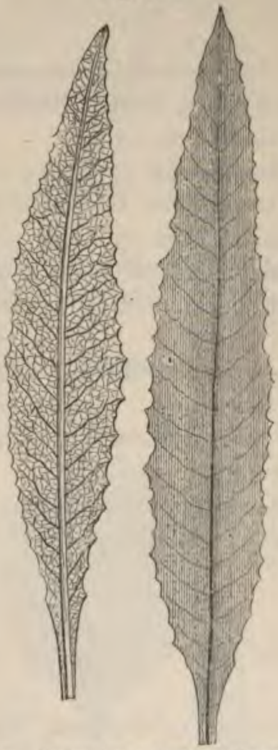
Habitat.—California.

Description.—Elliptic-lanceolate, 5 to 10 centimeters (2 to 4 inches) long, rather acute, more or less sinuately dentate; upper surface smooth, green, and varnished; lower surface reticulate and white-hairy; somewhat aromatic and balsamic, free from bitterness.

Constituents.—Volatile oil, resin.

Properties.—Expectorant. *Dose*, 2 to 4 grams (ʒss–j), in decoction or fluid extract.

Fig. 153.



Eriodictyon.—Natural size, lower and upper surface.

COMPTONIA.—Sweet Fern.

Origin.—Comptonia asplenifolia, *Aiton.* *Natural order*, Myricaceæ.

Habitat.—North America, in sterile soil.

Description.—Short-petiolate, linear-lanceolate, about 7 centimeters (3 inches) long, rather thin, pinnatifid with alternate roundish lobes, pubescent, resin-dotted; aromatic and astringent.

Constituents.—Volatile oil, tannin, gallic acid (?), saponin (?), etc.

Properties.—Stimulant, astringent. *Dose*, 1 to 2 grams (gr. xv–xxx).

HEPATICA.—Liverwort.

Origin.—Hepatica triloba, *Chaix.* *Natural order*, Ranunculaceæ.

Habitat.—North America and Europe, in woods.

Description.—Broad kidney-heart-shaped, about 5 centimeters (2 inches) long, petiolate, three-lobed, the lobes obtuse or acute; slightly leathery, smooth, and dark green above; inodorous, insipid, slightly astringent, and bitterish.

Constituents.—Mucilage, sugar, little tannin.

Properties.—Demulcent, deobstruent, tonic. *Dose*, 2 to 8 grams (ʒss–ij), in decoction.

ACONITI FOLIA.—Aconite Leaves.

Origin.—Aconitum Napellus, *Linné.* *Natural order*, Ranunculaceæ, Helleboreæ.

Habitat.—Europe, Northern Asia, Western North America, in mountainous regions.

Description.—Leaves petiolate, suborbicular, somewhat cordate, 5 to 10 centimeters (2 to 4 inches) in diameter, smooth, palmately three- or five-parted, the segments narrow wedge-shaped and incised, the divisions linear-lanceolate and toothed; petiole and midrib with a furrow above; odor slight; taste gradually bitter, acrid, tingling.

The leaves of Aconitum Stoerckeanum, *Reichenbach*, have the parts broadly wedge-shaped and the divisions lanceolate. The leaves of Ac. Cammarum, *Jacquin*, have rhomboid segments.

Constituents.—Aconitine (see Aconiti radix), napelline, gum, sugar, albumin, tannin, aconitic acid, ash 16 per cent.

Properties.—Anodyne, sedative, poisonous. *Dose*, 0.06 to 0.20 gram (gr. j–iij), in powder or extract.

MENYANTHES.—Buckbean, Bogbean.

Origin.—Menyanthes trifoliata, *Linné*. *Natural order*, Gentianaceæ.

Habitat.—Temperate Northern Hemisphere, in bogs.

Description.—Long-petioled, trifoliate; leaflets sessile, about 5 centimeters (2 inches) long, obovate-oblong, obtuse, narrowed below, entire or somewhat crenate, smooth, pale green; inodorous, bitter.

Constituents.—Menyanthin (amorphous, precipitated by tannin, insoluble in ether, glucoside, yields menyanthol, having a bitter-almond odor), mucilage, albumin, sugar, etc.

Properties.—Tonic, antiscorbutic, emmenagogue, vermifuge, febrifuge. *Dose*, 1 to 3 grams (gr. xv–xlv), in decoction or extract.

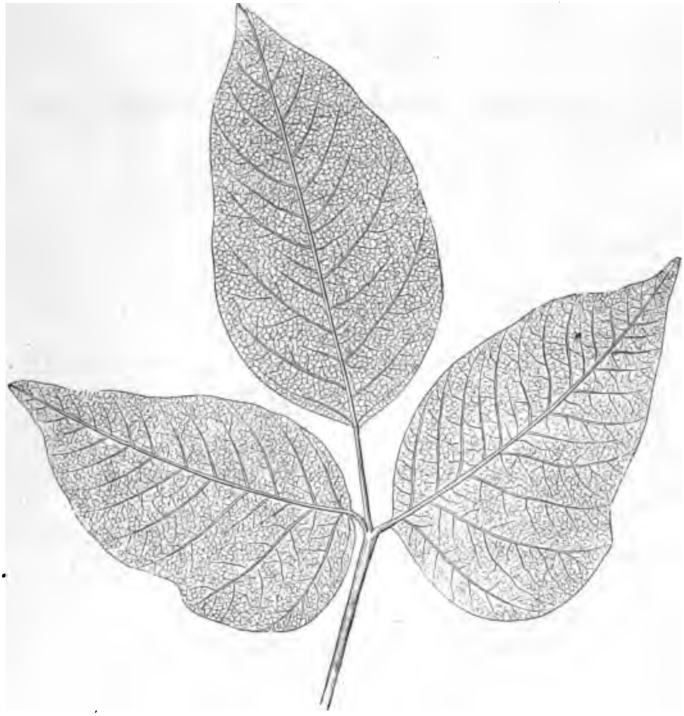
RHUS TOXICODENDRON.—Poison Oak.

Origin.—Rhus Toxicodendron, *Linné*. *Natural order*, Anacardiaceæ.

Habitat.—North America.

Description.—Long-petioled, trifoliate; the lateral leaflets sessile, about 10 centimeters (4 inches) long, obliquely-ovate, pointed; the terminal leaflet stalked, ovate or oval, pointed, often with a wedge-shaped base; all leaflets either entire or variously notched, coarsely toothed or lobed, downy beneath; after drying papery and brittle; inodorous, somewhat astringent, and acrid.

Fig. 154.



Rhus Toxicodendron.—Leaf one-half natural size.

Constituents.—Toxicodendric acid (volatile, reduces gold from the chloride), tannin, fixed oil, wax, mucilage, etc.

Properties.—Irritant, rubefacient; in paralysis, etc. *Dose*, 0.12 to 0.3 gram (gr. ij–v), gradually increased, in powder or tincture.

RUTA.—Rue.

Origin.—Ruta graveolens, *Linné.* *Natural order*, Rutaceæ.

Habitat.—Southern Europe; cultivated.

Description.—Petiolate, triangular-ovate in outline, 5 to 10 centimeters (2 to 4 inches) long, the upper ones pinnatifid, the others twice or thrice pinnate, the divisions thickish, spatulate or obovate-oblong, sparingly crenate, the terminal ones larger, smooth, finely pellucid-punctate, aromatic, balsamic, bitter, somewhat acrid.

Constituents.—Volatile oil $\frac{1}{4}$ per cent., rutin, $C_{12}H_{18}O_9$ (splits into sugar and quercetin), resin, etc. The volatile oil is greenish-yellow, freely soluble in alcohol, consists chiefly of methyl-nonyl-ketone, $CH_3.CO.C_9H_{19}$, and with nitric acid yields œnanthylic, caprylic, pelargonic, and caprinic acids.

Properties.—Irritant, stimulant, emmenagogue, nervine. *Dose*, 0.3 to 1.3 gram (gr. v–xx), in infusion.

CONII FOLIA.—Conium, Hemlock.

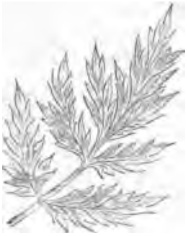
Origin.—Conium maculatum, *Linné.* *Natural order*, Umbelliferæ, Campylospermæ.

Habitat.—Asia and Europe; naturalized in North America, in waste and moist places.

Description.—Petioles hollow and sheathing, upper leaves sessile, broadly triangular-ovate in outline, 10 to 20 centimeters (4 to 8 inches) long, pinnately twice or thrice decompound, pinnæ oblong-lanceolate, pointedly toothed or incised; thin, gray-green, smooth; odor and taste disagreeable, narcotic.

Constituents.—Coniine (a minute quantity), volatile oil (not poisonous), albumen, mucilage, ash 12 per cent.

Fig. 155.



Conium.—Terminal portion of pinna.

Properties.—Sedative, narcotic. *Dose*, 0.3 gram (gr. v); much larger doses have produced little effect.

7. HERBS.—HERBÆ.

Under this heading all those drugs are comprised which are usually met with in commerce having those organs which are necessary for their botanical identification. Besides the few medicinal cryptogams, all medicinal herbs are dicotyledons and consist mostly of leaves and tender tops, the stems, if hard and tasteless, being rejected. Cryptogams which are employed in a partially developed state, or in a condition unsuited for botanical identification, will be found in Class 12.

Classification.

Sect. I. Thallogens. Plants destitute of fibro-vascular tissue and flowers

Thallus filiform, flattened above, repeatedly forked, margin crisped. Chondrus.

Thallus flattened, with air-vesicles in pairs.	Fucus vesiculosus.
Thallus compressed, the air-vesicles single.	Fucus nodosus.
Thallus flattened, lobed, and toothed; brownish above, whitish beneath.	Cetraria.
Sect. II. Ferns.	
Stipe polished; frond pinnate; leaflets triangular-oblong.	Adiantum.
Sect. III. Dicotyledons.	
1. Petals distinct.	
a. Petals five or four (3 in Polygala): stamens more than five; leaves alternate.	
Leaves with linear acute lobes; akenes numerous, tipped with a long hairy style.	Pulsatilla.
Base of stem tuberous; leaves three divided; akenes numerous, short-beaked.	Ranunculus.
Rhizome golden-yellow; leaves trifoliate; follicles 7, few seeded.	Coptis.
Leaves lyrate-pinnatifid; capsule linear.	Chelidonium.
Stem somewhat woody; leaves simple; capsule several- or many-seeded.	Helianthemum.
Leaves linear-oblong, pellucid-punctate; flowers yellow with black dots.	Hypericum.
Flowers irregular, purple; stamens 8, united.	Polygala.
Stamens diadelphous; leaves trifoliate, leaflets toothed, fragrant.	Melilotus.
Stamens monadelphous; leaves small trifoliate; leaflets entire; twigs pentangular.	Scoparius.
Stem woody; leaves lance-ovate; flowers purple.	Spiræa.
Leaves interruptedly pinnate; flowers small, yellow; calyx uncinate.	Agrimonia.
Leaves digitate, five-foliate; flowers axillary, yellow.	Potentilla.
Leaves lance-oblong; flowers showy, yellow; capsule long.	Œnothera.
Leaves lanceolate; flowers showy; purplish; capsule linear.	Epilobium

They should be collected in September or October, while still green.

Constituents.—Tannin, etc.

Properties.—Tonic, mild sedative. *Dose*, 2 to 8 grams (ʒss–ij), in infusion or fluid extract, in whooping-cough.

PERSICA.—Peach Leaves.

Origin.—Persica vulgaris, *De Candolle.* *Natural order*, Rosaceæ, Amygdaleæ.

Habitat.—Levant; cultivated.

Description.—Short-petiolate, lanceolate, about 10 centimeters (4 inches) long, pointed, closely serrate, smooth; odor slight, in infusion bitter-almond-like; taste taste bitter.

Constituents.—Amygdalin, tannin.

Properties.—Mild sedative, tonic. *Dose*, 2 grams (gr. xxx) in infusion.

TUSSILAGO.—Coltsfoot.

Origin.—Tussilago Farfara, *Linné.* *Natural order*, Compositæ, Eupatorieæ.

Habitat.—Northern Asia and Europe, naturalized in the United States.

Description.—Long-petiolate, roundish heart-shaped, about 10 centimeters (4 inches) in diameter, angular-toothed, smooth and green above, white tomentose beneath; inodorous; taste mucilaginous, bitterish and slightly astringent.

Constituents.—Mucilage, bitter principle, tannin.

Properties.—Demulcent, tonic. *Dose*, 2 to 4 grams (ʒss–j) in decoction.

ILEX OPACA.—Holly.

Origin.—Ilex opaca, *Aiton.* *Natural order*, Aquifoliaceæ.

Habitat.—United States.

Description.—Petiolate, oval, about 5 centimeters (2 inches) long, spinous wavy-toothed, coriaceous, smooth, inodorous; taste mucilaginous, bitterish, astringent.

Constituents.—Bitter principle, tannin.

Properties.—Demulcent, tonic, emetic. *Dose*, 1 to 2 grams (gr. xv–xxx).

CHIMAPHILA.—Pipsissewa, Prince's Pine.

Origin.—Chimaphila umbellata, *Nuttall.* *Natural order*, Ericaceæ, Pyroleæ.

Habitat.—Northern continents.

Description.—Oblanceolate, about 5 centimeters (2 inches) long, sharply serrate above, wedge-shaped and nearly entire towards the base; coriaceous, smooth, dark green on upper surface; nearly inodorous, and of an astringent and bitterish taste.

The leaves of the spotted pipsissewa, Chim. maculata, *Pursh*, indigenous to North America, are lanceolate or ovate-lanceolate, about 5 centimeters (2 inches) long, serrate, and upon the upper surface variegated with white.

Constituents.—Arbutin, ericolin, urson, tannin 4 per cent., chimaphilin (yellow, tasteless, volatile prisms), sugar, gum, ash 5 per cent.

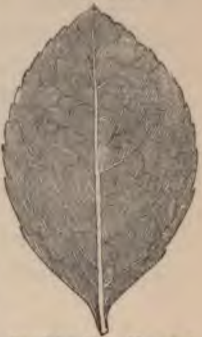
Properties.—Astringent, tonic, diuretic, nephritic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in decoction or fluid extract.

GAULTHERIA.—Gaultheria, Wintergreen.

Origin.—Gaultheria procumbens, *Linné.* *Natural order*, Ericaceæ Ericineæ.

Description.—Short-petiolate, obovate or roundish-oval, about 4 centimeters (1⅗ inch) long, and 2 centimeters (⅘ inch) or more broad, mucronate, slightly serrate with appressed teeth, coriaceous, smooth, glossy-green above, paler beneath; fragrant; taste aromatic and astringent.

Fig. 151.



Gaultheria.—Natural size.

Constituents.—Volatile oil, arbutin, ericolin, urson, tannin, sugar, gum, etc. The volatile oil is of spec. grav. 1.17, readily soluble in alcohol, colored dark purple by ferric chloride in alcoholic solution, and with nitric acid yields colorless prisms; it consists of gaultherilene, $C_{10}H_{16}$, and mainly of methyl salicylate, $CH_3.C_7H_5O_3$.

Properties.—Stimulant, astringent, diuretic, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

LAUROCERASUS.—Cherry Laurel.

Origin.—Prunus (Cerasus, *Loiseleur*) Laurocerasus, *Linné.* *Natural order*, Rosaceæ, Amygdaleæ.

Habitat.—Western Asia; cultivated in Southern Europe.

Description.—Short-petiolate, oblong or oblong-lanceolate, acute, somewhat revolute, distantly sharply serrate, underneath near the base one to three pairs of depressed glands; odor (when bruised) bitter-almond-like; taste aromatic, bitter.

Constituents.—Compound of amygdalin (?), emulsin, bitter principle, tannin, sugar, gum; after bruising and macerating in water, yield hydrocyanic acid and volatile oil, consisting of benzaldehyd, C_7H_6O.

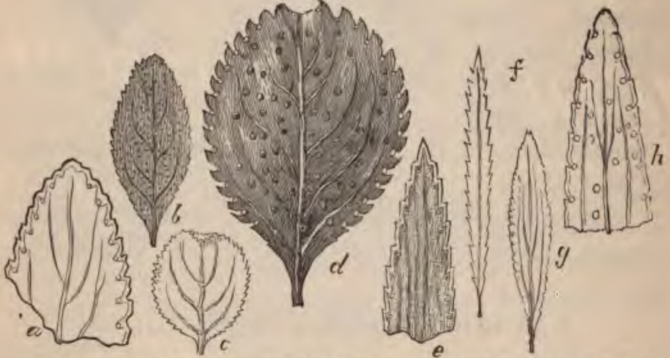
Properties.—Sedative; used for making cherry-laurel water.

BUCHU.—Buchu.

Origin.—Barosma betulina, *Bartling*, Bar. crenulata, *Hooker*, and Bar. serratifolia, *Willdenow*. *Natural order*, Rutaceæ.

Habitat.—Southern Africa.

Fig. 152.



Buchu.—*a*, *b*. Barosma crenulata, *Hooker*. *c*, *d*. Bar. betulina, *Bartling*. *g*, *h*. Bar. serratifolia, *Willdenow*. *e*, *f*. Empleurum serrulatum, *Aiton*. *b*, *c*, *f*, *g*, natural size.

Description.—Roundish-obovate, with a rather wedge-shaped base (B. betulina), or varying between oval and obovate (B. crenulata), about 2 to 3 centimeters (⅘–1⅕ inch) long, obtuse, crenate or serrate, with a gland at the base of each tooth, pale green, thickish, pellucid-punctate; strongly aromatic, somewhat mint-like, pungent, and bitterish.

The leaves of Bar. serratifolia are about 3 to 4 centimeters (1⅕–1⅗ inch) long, thinner, linear-lanceolate, obtuse—otherwise like the preceding.

Varieties.—Short buchu from B. betulina and B. crenulata; long buchu from B. serratifolia. The latter are sometimes mixed with the very similar leaves of Empleurum serrulatum, *Aiton* (*Natural order*, Rutaceæ), which are narrow linear, and, at the apex, acute and glandless.

Constituents.—Volatile oil (1–1.6 per cent. from short, 0.66 from long buchu; the stearopten diosphenol, is colored black-green by ferric salts), resin, mucilage, bitter principle, rutin (?), etc.

Properties.—Stimulant, tonic, diuretic. *Dose*, 1 to 2 grams (gr. xv–xxx), in infusion or fluid extract.

ERIODICTYON.—MOUNTAIN BALM.

Origin.—Eriodictyon californicum, *Bentham*. *Natural order*, Hydrophyllaceæ.

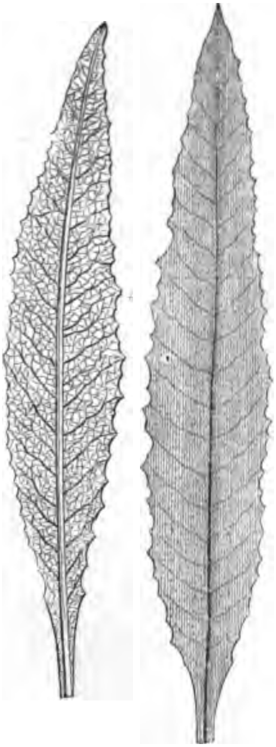
Habitat.—California.

Description.—Elliptic-lanceolate, 5 to 10 centimeters (2 to 4 inches) long, rather acute, more or less sinuately dentate; upper surface smooth, green, and varnished; lower surface reticulate and white-hairy; somewhat aromatic and balsamic, free from bitterness.

Constituents.—Volatile oil, resin.

Properties.—Expectorant. *Dose*, 2 to 4 grams (ʒss–j), in decoction or fluid extract.

Fig. 153.



Eriodictyon.—Natural size, lower and upper surface.

COMPTONIA.—Sweet Fern.

Origin.—Comptonia asplenifolia, *Aiton. Natural order*, Myricaceæ.

Habitat.—North America, in sterile soil.

Description.—Short-petiolate, linear-lanceolate, about 7 centimeters (3 inches) long, rather thin, pinnatifid with alternate roundish lobes, pubescent, resin-dotted; aromatic and astringent.

Constituents.—Volatile oil, tannin, gallic acid (?), saponin (?), etc.

Properties.—Stimulant, astringent. *Dose*, 1 to 2 grams (gr. xv–xxx).

HEPATICA.—LIVERWORT.

Origin.—Hepatica triloba, *Chaix.* *Natural order*, Ranunculaceæ.

Habitat.—North America and Europe, in woods.

Description.—Broad kidney-heart-shaped, about 5 centimeters (2 inches) long, petiolate, three-lobed, the lobes obtuse or acute; slightly leathery, smooth, and dark green above; inodorous, insipid, slightly astringent, and bitterish.

Constituents.—Mucilage, sugar, little tannin.

Properties.—Demulcent, deobstruent, tonic. *Dose*, 2 to 8 grams (℥ss–ij), in decoction.

ACONITI FOLIA.—ACONITE LEAVES.

Origin.—Aconitum Napellus, *Linné.* *Natural order*, Ranunculaceæ, Helleboreæ.

Habitat.—Europe, Northern Asia, Western North America, in mountainous regions.

Description.—Leaves petiolate, suborbicular, somewhat cordate, 5 to 10 centimeters (2 to 4 inches) in diameter, smooth, palmately three- or five-parted, the segments narrow wedge-shaped and incised, the divisions linear-lanceolate and toothed; petiole and midrib with a furrow above; odor slight; taste gradually bitter, acrid, tingling.

The leaves of Aconitum Stoerckeanum, *Reichenbach*, have the parts broadly wedge-shaped and the divisions lanceolate. The leaves of Ac. Cammarum, *Jacquin*, have rhomboid segments.

Constituents.—Aconitine (see Aconiti radix), napelline, gum, sugar, albumin, tannin, aconitic acid, ash 16 per cent.

Properties.—Anodyne, sedative, poisonous. *Dose*, 0.06 to 0.20 gram (gr. j–iij), in powder or extract.

MENYANTHES.—Buckbean, Bogbean.

Origin.—Menyanthes trifoliata, *Linné*. *Natural order*, Gentianaceæ.

Habitat.—Temperate Northern Hemisphere, in bogs.

Description.—Long-petioled, trifoliate; leaflets sessile, about 5 centimeters (2 inches) long, obovate-oblong, obtuse, narrowed below, entire or somewhat crenate, smooth, pale green; inodorous, bitter.

Constituents.—Menyanthin (amorphous, precipitated by tannin, insoluble in ether, glucoside, yields menyanthol, having a bitter-almond odor), mucilage, albumin, sugar, etc.

Properties.—Tonic, antiscorbutic, emmenagogue, vermifuge, febrifuge. *Dose*, 1 to 3 grams (gr. xv–xlv), in decoction or extract.

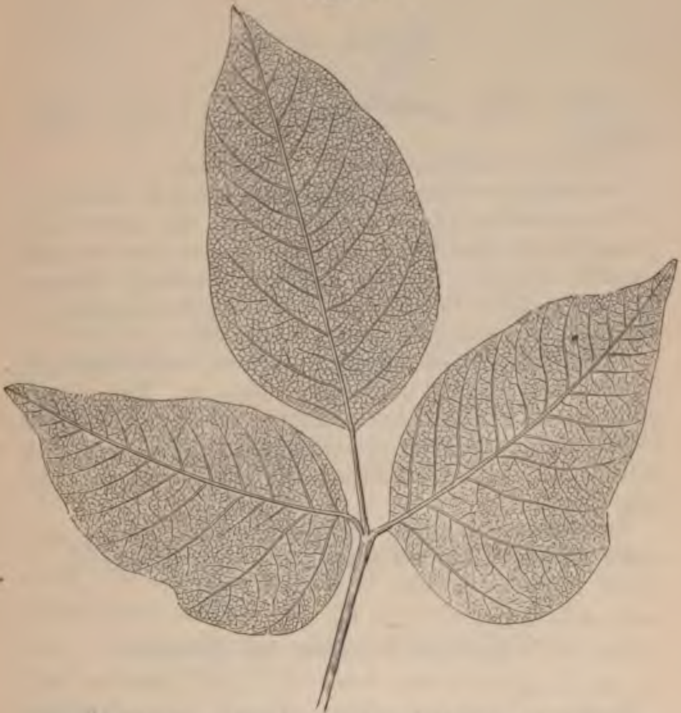
RHUS TOXICODENDRON.—Poison Oak.

Origin.—Rhus Toxicodendron, *Linné*. *Natural order*, Anacardiaceæ.

Habitat.—North America.

Description.—Long-petioled, trifoliate; the lateral leaflets sessile, about 10 centimeters (4 inches) long, obliquely-ovate, pointed; the terminal leaflet stalked, ovate or oval, pointed, often with a wedge-shaped base; all leaflets either entire or variously notched, coarsely toothed or lobed, downy beneath; after drying papery and brittle; inodorous, somewhat astringent, and acrid.

Fig. 154.



Rhus Toxicodendron.—Leaf one-half natural size.

Constituents.—Toxicodendric acid (volatile, reduces gold from the chloride), tannin, fixed oil, wax, mucilage, etc.

Properties.—Irritant, rubefacient; in paralysis, etc. *Dose*, 0.12 to 0.3 gram (gr. ij–v), gradually increased, in powder or tincture.

RUTA.—Rue.

Origin.—Ruta graveolens, *Linné*. *Natural order*, Rutaceæ.

Habitat.—Southern Europe; cultivated.

Description.—Petiolate, triangular-ovate in outline, 5 to 10 centimeters (2 to 4 inches) long, the upper ones pinnatifid, the others twice or thrice pinnate, the divisions thickish, spatulate or obovate-oblong, sparingly crenate, the terminal ones larger, smooth, finely pellucid-punctate, aromatic, balsamic, bitter, somewhat acrid.

Constituents.—Volatile oil ¼ per cent., rutin, $C_{12}H_{18}O_9$ (splits into sugar and quercetin), resin, etc. The volatile oil is greenish-yellow, freely soluble in alcohol, consists chiefly of methyl-nonyl-ketone, $CH_3.CO.C_9H_{19}$, and with nitric acid yields œnanthylic, caprylic, pelargonic, and caprinic acids.

Properties.—Irritant, stimulant, emmenagogue, nervine. *Dose*, 0.3 to 1.3 gram (gr. v–xx), in infusion.

CONII FOLIA.—Conium, Hemlock.

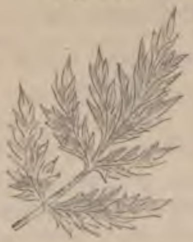
Origin.—Conium maculatum, *Linné*. *Natural order*, Umbelliferæ, Campylospermæ.

Habitat.—Asia and Europe; naturalized in North America, in waste and moist places.

Description.—Petioles hollow and sheathing, upper leaves sessile, broadly triangular-ovate in outline, 10 to 20 centimeters (4 to 8 inches) long, pinnately twice or thrice decompound, pinnæ oblong-lanceolate, pointedly toothed or incised; thin, gray-green, smooth; odor and taste disagreeable, narcotic.

Constituents.—Coniine (a minute quantity), volatile oil (not poisonous), albumen, mucilage, ash 12 per cent.

Fig. 155.



Conium.—Terminal portion of pinna.

Properties.—Sedative, narcotic. *Dose*, 0.3 gram (gr. v); much larger doses have produced little effect.

7. HERBS.—HERBÆ.

Under this heading all those drugs are comprised which are usually met with in commerce having those organs which are necessary for their botanical identification. Besides the few medicinal cryptogams, all medicinal herbs are dicotyledons and consist mostly of leaves and tender tops, the stems, if hard and tasteless, being rejected. Cryptogams which are employed in a partially developed state, or in a condition unsuited for botanical identification, will be found in Class 12.

Classification.

Sect. I. Thallogens. Plants destitute of fibro-vascular tissue and flowers

Thallus filiform, flattened above, repeatedly forked, margin crisped. Chondrus.

Thallus flattened, with air-vesicles in pairs.	Fucus vesiculosus.
Thallus compressed, the air-vesicles single.	Fucus nodosus.
Thallus flattened, lobed, and toothed; brownish above, whitish beneath.	Cetraria.

Sect. II. Ferns.

Stipe polished; frond pinnate; leaflets triangular-oblong.	Adiantum.

Sect. III. Dicotyledons.

1. Petals distinct.

a. Petals five or four (3 in Polygala): stamens more than five; leaves alternate.

Leaves with linear acute lobes; akenes numerous, tipped with a long hairy style.	Pulsatilla.
Base of stem tuberous; leaves three divided; akenes numerous, short-beaked.	Ranunculus.
Rhizome golden-yellow; leaves trifoliate; follicles 7, few seeded.	Coptis.
Leaves lyrate-pinnatifid; capsule linear.	Chelidonium.
Stem somewhat woody; leaves simple; capsule several- or many-seeded.	Helianthemum.
Leaves linear-oblong, pellucid-punctate; flowers yellow with black dots.	Hypericum.
Flowers irregular, purple; stamens 8, united.	Polygala.
Stamens diadelphous; leaves trifoliate, leaflets toothed, fragrant.	Melilotus.
Stamens monadelphous; leaves small trifoliate; leaflets entire; twigs pentangular.	Scoparius.
Stem woody; leaves lance-ovate; flowers purple.	Spiræa.
Leaves interruptedly pinnate; flowers small, yellow; calyx uncinate.	Agrimonia.
Leaves digitate, five-foliate; flowers axillary, yellow.	Potentilla.
Leaves lance-oblong; flowers showy, yellow; capsule long.	Œnothera.
Leaves lanceolate; flowers showy; purplish; capsule linear.	Epilobium

b. Petals and stamens five.	
Leaves with foliaceous pinnatifid stipules; corolla one-spurred.	Viola tricolor.
Leaves rosulate, fleshy, glandular-bristly.	Drosera.
c. Petals and stamens numerous.	
Sepals and white petals imbricate; branches fleshy, pentangular, spiny.	Cactus.
2. Petals united.	
a. Flowers in a close head on a receptacle surrounded by an involucre.	
Pappus slender bristly; leaves lanceolate, connate-perfoliate.	Eupatorium.
leaves alternate; rays numerous, very narrow, purplish or whitish.	Erigeron.
rays inconspicuous, not longer than pappus.	Erigeron canadense.
florets yellow; heads in recurved racemes, small.	Solidago.
Pappus three awns; florets yellow; rays conspicuous; leaves rigid.	Grindelia.
Pappus of 5 awned scales; florets yellow; rays conspicuous; stem winged.	Helenium.
Pappus none, or a short crown; leaves alternate; rays white; receptacle conical, chaffy.	Cotula.
rays white; receptacle flat, chaffy.	Achillea.
rays white; receptacle convex, naked.	Parthenium.
rays yellow; receptacle convex, naked.	Tanacetum.
rays none; receptacle small, hairy.	Absinthium.
receptacle small, smooth; leaves green above.	Artemisia.
plant white, woolly.	Gnaphalium.
rays yellow; receptacle flat, naked.	Calendula.
rays none; receptacle bristly; involucre and leaves soft-spiny.	Centaurea.
b. Flowers not in heads; corolla more or less two-lipped.	
Leaves alternate; stamens 5, forming a tube.	Lobelia.
stamens 4; plant yellowish-brown.	Epiphegus.

Leaves opposite, not glandular; stamens 4; corolla urn-shaped; lips short.	Scrophularia.
coralla inflated; upper lip arched.	Chelone.
Leaves opposite, glandular; lips nearly equal; stamens 4; inflorescence terminal; spikes slender, acute.	Mentha viridis.
spikes conical, obtuse.	Mentha piperita.
stamens 2; flowers in axillary whorls.	Lycopus.
upper lip erect; stamens 2, exserted; inflorescence cymose.	Cunila.
stamens 4, exserted; inflorescence spicate.	Hyssopus.
inflorescence corymbose, bracts reddish.	Origanum.
inflorescence clustered, spicate, bracts gray-green.	Majorana.
corolla short, slightly 2-lipped, stamens 4; inflorescence spicate; leaves small linear.	Thymus (see Leaves).
leaves small ovate.	Serpyllum.
corolla curved, two-lipped; stamens 4, upper pair shorter; flowers in axillary whorls.	Melissa.
corolla small, two-lipped; filaments 4, only two with anthers.	Hedeoma.
corolla long, with narrow lips; stamens 2; bracts variegated.	Monarda.
upper lip arched; stamens 4, the lower pair shorter; floral leaves bract-like.	Cataria.
flowers in axillary cymulus; corolla exserted.	Glechoma.
upper lip erect; stamens 4, short; flowers in dense axillary whorls.	Marrubium.
stamens 4, the lower pair longer; calyx lips entire, upper one with helmet-like projection.	Scutellaria.
calyx spiny-five-toothed; leaves palmately lobed.	Leonurus.

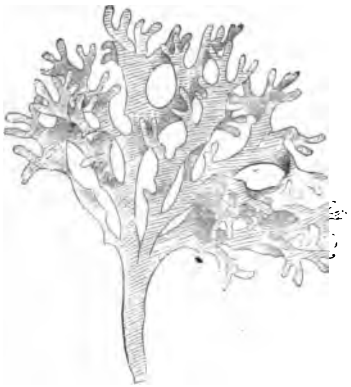
c. Flowers not in heads; corolla lobes spreading.	
Corolla salver-form; flowers in dense spikes; leaves rosulate.	Plantago.
flowers in pairs; leaves opposite.	Mitchella.
Corolla rotate; leaves in whorls, rough on the margin.	Galium.
leaves opposite, sessile, oblong-ovate, acute (or linear-oblong).	Sabbatia.
obovate-oblong obtuse.	Centaurium.
ovate acuminate; drug brown.	Chiretta.
3. Petals absent.	
Leaves digitate; leaflets lanceolate, acute serrate.	Cannabis.

CHONDRUS.—Irish Moss.

Origin.—Chondrus crispus, *Lyngbye*, and Chondrus mamillosus, *Greville*. *Natural order*, Algæ.

Habitat.—Atlantic Ocean.

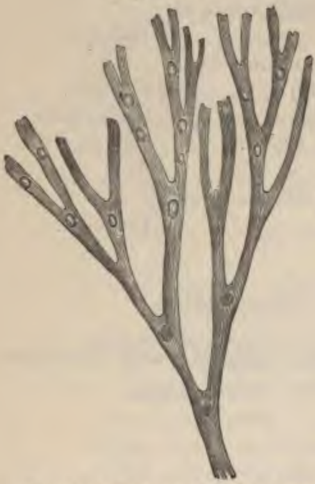
Fig. 156.



Chondrus crispus.

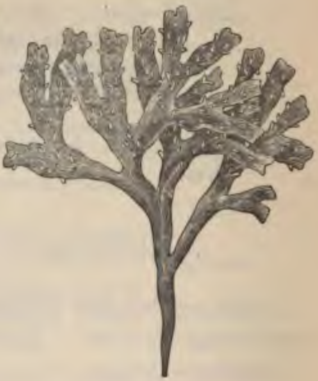
Description.—Yellowish or whitish, horny, translucent, when softened in water cartilaginous, many-forked, segments flat, wedge-shaped or linear, at the apex emarginate or two-lobed; spore vessels imbedded in the

Fig. 157.



Chondrus crispus.—Narrow form, with fruit.

Fig. 158.



Chondrus mamillosus.

frond, in Ch. mamillosus short-stipitate; odor slight sea-weed-like; taste mucilaginous, somewhat saline.

One part of it boiled for ten minutes with 30 parts of water yields a solution which gelatinizes on cooling.

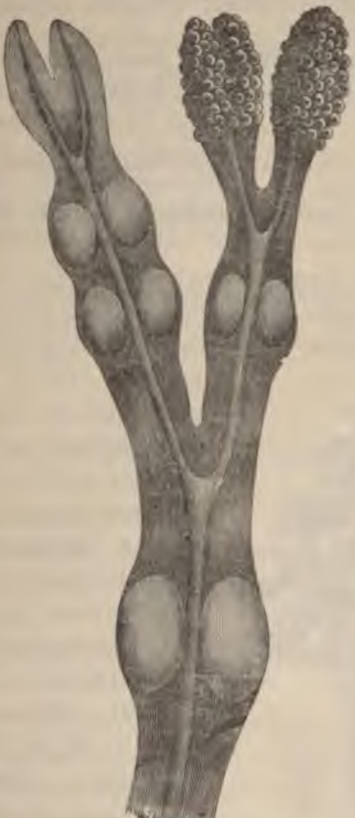
Constituents.—Aside from moisture, consists almost wholly of mucilaginous compounds and 8–15 per cent. ash, chiefly chlorides, sulphates, and phosphates, with traces of bromides and iodides.

Properties.—Demulcent, somewhat nutritive. *Dose,* 4 to 8 grams (ʒj–ij), in decoction or jelly.

FUCUS VESICULOSUS.—BLADDER-WRACK.

Origin.—Fucus vesiculosus, *Linné*. *Natural order*, Algæ.
Habitat—Atlantic Ocean.

Fig. 159.



Fucus vesiculosus, *Linné*.—Fruiting branch, natural size.

Description.—About 1 meter (40 inches) long, and 15 millimeters ($\frac{3}{5}$ inch) broad, flattened, branched, with a midrib and the air-vesicles in pairs, blackish; odor like sea-weeds; taste mucilaginous, saline.

Fucus nodosus, *Linné*, is narrow, without midrib, air-vesicles single, otherwise like the preceding.

Constituents.—Organic matter 62, ash 16, moisture 22 per cent. Organic principles: mucilage, mannit, fat, etc. Ash: chlorides, bromides, iodides, phosphates, and sulphates.

Properties—Alterative. *Dose*, about 8 grams (ʒij), in decoction; recommended in obesity.

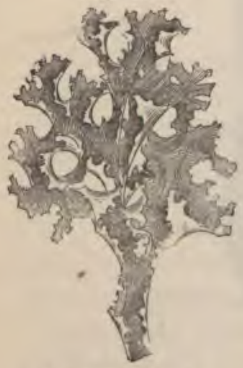
CETRARIA.—Iceland Moss.

Origin.—Cetraria islandica, *Acharius*. *Natural order*, Lichenes.

Habitat.—Northern hemisphere.

Description.—Five to ten centimeters (2 to 4 inches) long, foliaceous, with fringed and channelled lobes, brownish above, whitish beneath, brittle and inodorous; when softened in water, cartilaginous and of a slight odor; taste mucilaginous and bitter.

Fig. 160.



Cetraria islandica.

Pine leaves, mosses, and other lichens, which are frequently found mixed with it, should be removed.

Constituents. — Lichenin, $C_{12}H_{20}O_{10}$, 70 per cent., cetraric acid, $C_{18}H_{16}O_8$, 2 per cent. (crystalline, bitter), lichen-stearic acid, $C_{14}H_{34}O_3$, 1 per cent., fumaric acid, oxalic acid, sugar, cellulose 16 per cent., ash 1–2 per cent.

Properties.—Demulcent, tonic, nutritive. *Dose*, 4 to 8 grams (ʒj–ij), in decoction or jelly.

ADIANTUM.—MAIDENHAIR.

Origin.—Adiantum pedatum, *Linné.* *Natural order*, Filices.

Habitat.—North America, in woods.

Description.—About 30 centimeters (12 inches) high; stipe polished, brown-black, forked at the summit and branched; branches nearly horizontal, each bearing on one side about six linear-lanceolate pinnæ; leaflets triangular-oblong, crenately-toothed on the upper margin; fruit-dots at the apex of the teeth; odor faintly aromatic; taste mucilaginous, sweetish, slightly astringent and bitter.

Constituents.—Mucilage, tannin, bitter principle.

Properties.—Demulcent, expectorant, tonic. *Dose*, 2 to 4 grams (ʒss–j).

PULSATILLA.—PULSATILLA.

Origin.—Anemone (Pulsatilla, *Miller*) pratensis, *Linné*, An. Pulsatilla, *Linné*, and An. patens, *Linné*, var. Nuttaliana, *Gray*. *Natural order*, Ranunculaceæ, Anemoneæ.

Habitat.—Europe, the variety Nuttaliana in Western North America.

Description.—Leaves radical, petiolate, silky-villous, twice or thrice deeply three-parted or pinnately cleft, with linear acute lobes, appearing after the large purple (or in the last-named species sometimes whitish) flowers;

akenes numerous, prolonged into the hairy style; inodorous; very acrid.

The herb should be collected shortly after flowering, carefully preserved, and not kept longer than one year.

Constituents.—Acrid, volatile oily substance, easily converted into anemonin, $C_{15}H_{12}O_6$ (crystalline, when melted very acrid), and anemonic acid, $C_{15}H_{14}O_7$ (crystalline, tasteless).

Properties.—Irritant, diuretic, diaphoretic, expectorant, dilating the pupil; poisonous. *Dose,* 0.12 to 0.6 (gr. ij–x), in powder, tincture, or extract.

RANUNCULUS.—Crowfoot, Buttercups.

Origin.—Ranunculus bulbosus, *Linné. Natural order,* Ranunculaceæ, Ranunculeæ.

Habitat.—Europe, naturalized in North America, in grassy places.

Description.—Base of stem tuberous; radical leaves with sheathing petioles, ternate, the lateral divisions sessile, rhomboid wedge-shaped, three-cleft, hairy; stem leaves smaller; flowers yellow, five-petalous, with a reflexed calyx, numerous stamens and ovaries, the latter forming akenes with a short curved beak; inodorous; taste very acrid.

Ranunculus repens, *Linné,* not bulbous; leaflets stalked; akenes straight-beaked.

Ran. acris, *Linné,* not bulbous, leaflets sessile; akenes with a sharped curved beak.

Constituents.—Yellow, volatile oily liquid, readily converted into anemonin and anemonic acid.

Properties.—Irritant, diuretic, externally used as a counter-irritant.

COPTIS.—Goldthread.

Origin.—Coptis trifolia, *Salisbury.* *Natural order,* Ranunculaceæ, Aconiteæ.

Habitat.—Northern continents.

Description.—Rhizome filiform, golden-yellow, with very thin rootlets; leaves radical, from a scaly base, petiolate, trifoliate, the leaflets about 1 centimeter ($\frac{2}{5}$ inch) long, wedge-obovate, obtusely three-lobed and mucronately crenate; flowers single, yellowish; fruit about seven follicles, containing a few black seeds; inodorous, strongly bitter.

Constituents.—Berberine, coptine (white alkaloid), resin, sugar, etc., ash 4–5 per cent.; no tannin.

Properties.—Tonic. *Dose,* 1 to 4 grams (gr. xv–ʒj), in decoction.

CHELIDONIUM.—Celandine.

Origin.—Chelidonium majus, *Linné.* *Natural order,* Papaveraceæ.

Habitat.—Europe; naturalized in North America; in waste and cultivated grounds.

Description.—Root several-headed, red-brown; stem about 50 centimeters (20 inches) high, hairy; leaves 10 to 20 centimeters (4 to 8 inches) long, the upper ones sessile, light green above, glaucous beneath, lyrate-pinnatifid, the pinnæ ovate-oblong, obtuse, coarsely crenate or incised, the terminal one often three-lobed; petals 4, yellow; capsule linear, two-valved, one-celled, many-seeded; odor, when fresh, unpleasant; taste acrid. The whole plant contains a saffron-colored milk-juice.

Constituents.—Chelerythrine (identical with sanguinarine), chelidonine, $C_{19}H_{17}N_3O_3$ (crystalline, bitter, acrid, the salts colorless), chelidoxanthin (yellow bitter needles), chelidonic acid.

Properties.—Diuretic, cathartic. *Dose*, 1 to 4 grams (gr. xv–ʒj), the extract 0.5 to 1 gram (gr. viij–xv); the milk-juice externally as a caustic.

HELIANTHEMUM.—Frostwort.

Origin.—Helianthemum canadense, *Michaux*, and Helianthemum corymbosum, *Michaux*. *Natural order*, Cistaceæ.

Habitat.—North America, in sandy woods and fields.

Description.—About 30 centimeters (12 inches) high; stem rigid, slender, hairy; leaves alternate, entire, elliptic or linear-lanceolate, about 2 centimeters (⅘ inch) long, woolly beneath; flowers of two kinds, the earlier ones single with five large yellow caducous petals; the later ones in hoary clusters, nearly sessile, apetalous; inodorous, bitterish, astringent.

The second species is very similar, but has the stem branched from the base, the leaves narrower, densely tomentose underneath, the flowers all clustered at the summit, the apetalous ones being in glomerate terminal cymes.

Constituents.—Tannin, bitter principle.

Properties.—Tonic, astringent, alterative. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in decoction.

HYPERICUM.—St. John's Wort.

Origin.—Hypericum perforatum, *Linné*. *Natural order*, Hypericaceæ.

Habitat.—Asia and Europe; naturalized in North America.

Description.—Erect, about 50 centimeters (20 inches) high, smooth; stem somewhat two-edged; leaves opposite, sessile, linear-oblong, pellucid-punctate; flowers about 2 centimeters (⅘ inch) broad, in terminal cymes, yellow, black-dotted; odor slight, balsamic; taste acrid, bitter.

Constituents.—Resin, tannin, red coloring matter (soluble in alcohol, ether, and oils).

Properties.—Stimulant, discutient; mostly used externally.

POLYGALA.—Bitter Polygala.

Origin—Polygala rubella, *Willdenow. Natural order*, Polygalaceæ.

Habitat.—North America, in grassy places.

Description.—Ascending, smooth, about 20 centimeters (8 inches) high, somewhat branched; leaves alternate, oblanceolate or lance-linear, mucronate; inflorescence racemose; flowers purple, the keel crested and shorter than the wings; capsule oval-oblong, two-seeded, the seeds with a scale-like crest; bitter.

Constituents.—Bitter principle.

Properties.—Tonic.

MELILOTUS.—Sweet Clover.

Origin.—Melilotus altissimus, *Thuilliers* (M. officinalis, *Willdenow*), and Mel. albus, *Desrousseaux. Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—Europe, naturalized in North America.

Description.—Erect, about 1.2 meter (4 feet high), smooth, much branched; stipules entire, awl-shaped; leaves alternate, trifoliate; leaflets oval or obovate-oblong, sharply serrate, near the base entire; flowers small, yellow or white, racemose; odor fragrant, stronger on drying; taste aromatic, somewhat pungent and bitter.

Constituents.—Coumarin (see Dipterix).

Properties.—Stimulant, discutient; mostly used externally.

SCOPARIUS.—Broom.

Origin.—Sarothamnus scoparius, *Koch.* *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—Western Asia, Southern and Western Europe.

Description.—Thin flexible twigs, pentangular, winged, nearly smooth, tough, usually free from leaves, which are small trifoliate, the leaflets obovate-oblong, entire; flowers racemose, showy, yellow, with ten monadelphous stamens; odor, when bruised, peculiar; taste disagreeably bitter.

Constituents.—Volatile oil, scoparin, $C_{21}H_{22}O_{10}$ (tasteless), sparteine, $C_{15}H_{26}N_2$ (colorless bitter oil), tannin, fat, wax, sugar, ash 5–6 per cent.

Properties.—Diuretic, somewhat narcotic, in large doses emetic. *Dose*, 1 to 2 grams (gr. xv–xxx), in decoction.

SPIRÆA.—Hardhack.

Origin.—Spiræa tomentosa, *Linné.* *Natural order*, Rosaceæ, Spiræeæ.

Habitat.—North America.

Description.—Stem slender, red-brown, woody; leaves alternate, lance-ovate, serrate, rusty tomentose beneath; inflorescence racemose paniculate; flowers small with 5 purplish-red petals, numerous stamens and 4 or 5 ovaries, producing one-seeded woolly follicles; odor slight aromatic; taste astringent, somewhat bitter.

Constituents.—Tannin, bitter principle.

Properties.—Astringent, tonic. *Dose*, 2 to 4 grams (ʒss–j).

AGRIMONIA.—AGRIMONY.

Origin.—Agrimonia Eupatoria, *Linné*. *Natural order*, Rosaceæ, Dryadeæ.

Habitat.—Europe and North America, in grassy places.

Description.—Erect, hairy; stem about 60 centimeters (2 feet) high, roundish angular, nearly simple; leaves alternate, petiolate, pinnate, with clasping serrate stipules, and about 6 pairs of elliptic-oblong coarsely toothed leaflets with several pairs of minute ones; inflorescence slender, racemose; calyx persistent, with hooked bristles; petals 5, small, yellow; stamens about 10; fruit one or two akenes; odor faintly aromatic; taste mildly bitter and astringent.

Constituents.—Tannin, bitter principle.

Properties.—Tonic, astringent. *Dose*, 2 to 4 grams (ʒss–j).

POTENTILLA.—CINQUEFOIL.

Origin.—Potentilla canadensis, *Linné*. *Natural order*, Rosaceæ, Dryadeæ.

Habitat.—North America, in sandy soil.

Description.—Ascending, with slender runners; leaves petiolate, digitate; the five leaflets obovate or oblanceolate, incised above; flowers axillary, stalked; calyx five-cleft; petals 5, yellow; stamens, ovaries, and akenes numerous; inodorous, astringent.

Constituents.—Tannin.

Properties.—Astringent. *Dose*, 2 to 4 grams (ʒss–j).

ŒNOTHERA.—EVENING PRIMROSE.

Origin.—Œnothera biennis, *Linné*. *Natural order*, Onagraceæ.

Habitat.—North America, in fields; naturalized in Europe.

Description.—Erect, hairy, branched; leaves alternate, short-petiolate, ovate-oblong or oblong-lanceolate, acute, slightly toothed; inflorescence spicate, leafy; calyx superior, the four lobes reflexed; petals four, showy, light yellow, obcordate; stamens 8; capsule sessile, roundish, four-sided, about 3 centimeters (1⅕ inch) long; seeds numerous; taste mildly astringent.

Constituents.—Mucilage, tannin.

Properties.—Alterative, astringent. *Dose*, 2 to 4 grams (ʒss–j).

EPILOBIUM.—WILLOW HERB.

Origin.—Epilobium angustifolium, *Linné*. *Natural order*, Onagraceæ.

Habitat.—Northern Hemisphere, in low grounds and open woodlands.

Description.—Erect, smooth, about 1 meter (40 inches) high; leaves subsessile, alternate, lanceolate, pointed, nearly entire, pale green beneath; inflorescence racemose; calyx superior, four-lobed; petals 4, purplish or pink, showy; stamens 8; capsule linear, about 5 centimeters (2 inches) long, somewhat curved; seeds numerous, with a tuft of hairs; taste mucilaginous, astringent.

Constituents.—Mucilage, tannin, etc.

Properties.—Demulcent, astringent. *Dose*, 2 to 4 grams (ʒss–j).

VIOLA TRICOLOR.—Pansy, Heart's Ease.

Origin.—Viola tricolor, *Linné.* *Natural order*, Violaceæ.

Habitat.—Europe, North America, and Northern Asia; cultivated; but the wild-grown plant alone should be collected.

Description.—Stem 15 to 30 centimeters (6 to 12 inches) high, angular, nearly smooth; leaves alternate, petiolate, ovate or oblong, crenate; stipules leaf-like, pinnatifid; petals shorter or longer than the calyx, variegated, forming one obtuse spur; inodorous; taste mucilaginous, somewhat bitter and acrid.

Constituents.—Mucilage, sugar, salicylic acid 0.1 per cent., bitter principle, resin, etc.

Properties.—Alterative, expectorant, in large doses emetic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in decoction or extract.

DROSERA.—Sundew.

Origin.—Drosera rotundifolia, *Linné.* *Natural order*, Droseraceæ.

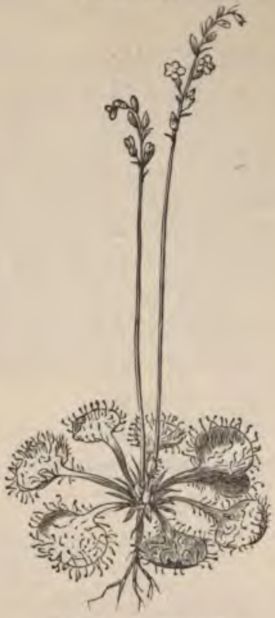
Habitat.—North America and Europe, in boggy places.

Description.—Leaves radical, rosulate, petiolate, orbicular, about 8 millimeters (⅓ inch) broad; fleshy, with purple glandular bristles; scape slender; inflorescence racemose, one-sided; flowers small, whitish; inodorous; taste acidulous, acrid and bitter.

Drosera longifolia, *Linné*, has spatulate leaves.

Constituents.—Citric acid, acrid resin, etc.
Properties.—Pectoral, rubefacient.

Fig. 161.



Drosera rotundifolia.

CACTUS.—NIGHT-BLOOMING CEREUS.

Origin.—Cactus (Cereus, *Miller*) grandiflorus, *Linné*. *Natural order*, Cactaceæ.

Habitat.—Tropical America, cultivated.

Description.—The fresh flowering branches are used. Branches weak, fleshy, five- or six-angled, on the edges with clusters of 5 or 6 spines; flowers sessile, large, fragrant; calyx imbricate, brownish and yellow; corolla white; stamens numerous; fruit berry-like; taste acrid.

Constituents.—No analysis.

Properties.—Vermifuge, emetic, cathartic. *Dose*, 0.3 gram (gr. v), in fluid extract or tincture.

EUPATORIUM.—THOROUGHWORT, BONESET.

Origin.—Eupatorium perfoliatum, *Linné. Natural order*, Compositæ, Eupatorieæ.

Habitat.—North America, in low grounds.

Description.—Leaves opposite, united at base, lanceolate, 10 to 15 centimeters (4 to 6 inches) long, tapering, crenately serrate, rugosely veined, rough above, downy and resinous dotted beneath; flower heads corymbed, numerous, with an oblong involucre of lance-linear scales, and with 10 to 15 tubular white florets, having a bristly pappus in a single row; odor aromatic, weak; taste astringent and strongly bitter.

Constituents.—Eupatorin (bitter glucoside), volatile oil, resin, tannin, gum, sugar, ash 7.5 per cent.

Properties.—Stimulant, tonic, diaphoretic, laxative, emetic. *Dose*, 2 to 4 grams (ʒss–j), in infusion or fluid extract.

ERIGERON.—ERIGERON, FLEABANE, SCABIOUS.

Origin.—Erigeron philadelphicum, *Linné*, Erigeron annuum, *Persoon;* and Erigeron strigosum, *Muhlenberg. Natural order*, Compositæ, Asteroideæ.

Habitat.—North America, in fields and pastures.

Description.—The three plants are similar in aspect; erect and hairy. Radical leaves petiolate, ovate, or lanceolate, coarsely toothed, serrate, or (E. strigosum) nearly entire; stem leaves smaller, alternate, petiolate, the upper ones sessile, somewhat toothed or entire; all hairy; flower-heads corymbose, with the involucral scales narrow and nearly equal, the receptacle flattish and naked, the ray florets numerous, narrow, in one or two rows, purplish or white, and the disk florets numerous, tubular, and yellow; pappus bristly, simple (E. philadelphicum) or double (the other two species); odor slightly aromatic; taste bitterish, astringent.

Constituents.—Volatile oil a trace, bitter principle, tannin.

Properties.—Diuretic, diaphoretic tonic. *Dose*, 2 to 4 grams (ʒss–j), in infusion.

ERIGERON CANADENSE.—CANADA ERIGERON.

Origin.—Erigeron canadense, *Linné*. *Natural order*, Compositæ, Asteroideæ.

Habitat.—North America, in fields and waste places; naturalized in other countries.

Description.—Bristly-hairy and erect; leaves alternate, sessile, lance-linear, nearly entire; flower-heads in corymbose panicles, numerous, small, with a cylindrical involucre, inconspicuous ray florets, and a straw-colored bristly pappus; odor aromatic; taste bitterish, somewhat acrid and astringent.

Constituents.—Volatile oil, bitter principle, tannin. The volatile oil has spec. grav. 0.845, is soluble in alcohol, and becomes thick and brown by age.

Properties.—Stimulant, tonic, diuretic, styptic. *Dose*, 2 to 4 grams (ʒss–j), in infusion.

SOLIDAGO.—GOLDEN ROD.

Origin.—Solidago odora, *Aiton*. *Natural order*, Compositæ, Asteroideæ.

Habitat.—North America, border of woods.

Description.—Erect; leaves smooth, sessile, linear-lanceolate, 3 to 5 centimeters (1 or 2 inches) long, entire, acute, pellucid-punctate; flower-heads small, numerous, in one-sided recurved racemes, with a yellowish scaly appressed involucre; several yellow florets and bristly pappus; odor and taste sweet, anise-like.

Constituents.—Volatile oil, probably containing anisol.

Properties.—Stimulant, Carminative, diaphoretic. *Dose*, 2 to 8 grams (ʒss–ij) in infusion.

GRINDELIA.—GRINDELIA.

Origin.—Grindelia robusta, *Nuttall. Natural Order*, Compositæ, Asteroideæ.

Habitat.—North America, west of the Rocky Mountains.

Description.—The leaves and flowering tops are collected. Leaves varying from broadly spatulate or oblong to lanceolate, sessile, or clasping, about 5 centimeters (2 inches) or less long, obtuse, more or less sharply serrate, pale green, smooth, finely dotted, thick and brittle; heads many-flowered; the involucre hemispherical, about 15 millimeters (⅜ inch) broad, composed of numerous imbricated squarrosely tipped, often resinous scales, ray-florets yellow, ligulate, pistillate; disk-florets yellow, tubular, perfect; pappus consisting of about three awns of the length of the disk-florets; odor balsamic; taste pungently aromatic and bitter.

Constituents.—Volatile oil, resin.

Properties.—Sedative in asthma; externally in rhus poisoning. *Dose*, 1 to 4 grams (gr. xv–ʒj), in tincture or fluid extract.

HELENIUM.—SNEEZEWORT.

Origin.—Helenium autumnale, *Linné*. *Natural order*, Compositæ, Senecionideæ.

Habitat.—United States, in thickets.

Description.—Erect, nearly smooth; stem about 1.2 meter (4 feet) high, quadrangular, winged; leaves sessile, alternate, lanceolate, pointed, serrate; flower-heads numerous with a two-rowed involucre, a naked hemispherical receptacle, long yellow pistillate ray-florets, yellow perfect disk-florets, and top-shaped akenes having a pappus of 5 awned scales; taste bitter, acrid.

Constituents.—Bitter glucoside, resin, malic acid, little tannin, etc.

Properties.—Diaphoretic, errhine.

COTULA.—MAYWEED, WILD CHAMOMILE.

Origin.—Maruta (Anthemis, *Linné*) Cotula, *De Candolle*. *Natural order*, Compositæ, Senecionideæ.

Habitat.—Europe, naturalized in North America, in fields and waste places.

Description.—Nearly smooth, pale green; stem ascending, branched, furrowed; leaves sessile, thrice pinnatifid with linear subulate segments; flower-heads terminal with a conical chaffy receptacle; white ligulate neutral rays, yellow perfect disk-florets and obovoid akenes without pappus; odor unpleasant aromatic; taste bitter acrid.

Constituents.—Volatile oil, valerianic acid, acrid fat, tannin, anthemidine (?), anthemic acid (crystalline, bitter, soluble in ether).

Properties.—Stimulant, antispasmodic, sudorific. *Dose*, 2 to 8 grams (ʒss–ij), in infusion.

ACHILLEA.—YARROW, MILFOIL.

Origin.—Achillea Millefolium, *Linné.* *Natural order*, Compositæ, Senecionideæ.

Habitat.—Northern temperate zone, in fields.

Description.—Erect, hairy; leaves nearly sessile, lanceolate in outline, glandular beneath, 5 to 25 centimeters (2 to 10 inches) long, thrice pinnatifid with linear-spatulate, toothed segments; flower-heads corymbed with an oblong imbricate involucre, flat chaffy receptacle, five short white pistillate rays, greenish-white perfect disk-florets, and oblong flat akenes without pappus; odor somewhat chamomile-like; taste bitter aromatic.

Constituents.—Volatile oil 0.1 per cent. (blue or dark green), achilleine, $O_{20}C_{38}H_2N_{15}$ (amorphous, bitter), resin, tannin, aconitic acid; ash about 15 per cent.

Properties.—Stimulant, tonic, emmenagogue. *Dose*, 2 to 4 grams (ʒss–j), in infusion.

PARTHENIUM.—FEVERFEW.

Origin.—Pyrethrum (Matricaria, *Linné*) Parthenium, *Smith.* *Natural order*, Compositæ, Senecionideæ.

Habitat.—Europe, cultivated.

Description.—Erect, pubescent; leaves alternate, petiolate, broadly ovate, bipinnatifid, the segments oblong, obtuse, and somewhat toothed; flower-heads in terminal cymes, with a two-rowed involucre, a naked hemispherical receptacle, white ligulate and obtusely three-toothed rays and yellow tubular disk-florets; odor and taste chamomile-like, bitter.

Constituents.—Volatile oil, bitter principle, tannin.

Properties.—Stimulant, tonic. *Dose*, 1 to 4 grams (gr. xv–ʒj).

TANACETUM.—Tansy.

Origin.—Tanacetum vulgare, *Linné.* *Natural order*, Compositæ, Senecionideæ.

Habitat.—Asia and Europe; naturalized in North America; cultivated.

Description.—The leaves and flowering tops are collected, stem erect, smooth; leaves nearly sessile, about 15 centimeters (6 inches) long, bipinnatifid, the segments oblong, obtuse, serrate or incised, dark green, and glandular; flower-heads corymbose, with an imbricated involucre, a convex naked receptacle, numerous yellow tubular florets, and obovate akenes having a short crown; odor strongly aromatic; taste pungent and bitter.

Constituents.—Volatile oil ¼ per cent. (spec. grav. 0.93, yellow or green, freely soluble in alcohol), tanacetin (bitter, granular, precipitated by tannin), fat, resin, tannin, mucilage, sugar.

Properties.—Stimulant, tonic, anthelmintic, diuretic, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

ABSINTHIUM.—Wormwood.

Origin.—Artemisia Absinthium, *Linné.* *Natural order*, Compositæ, Senecionideæ.

Habitat.—Northern Asia, Europe, and Northern Africa; naturalized in North America; cultivated.

Description.—The leaves and flowering tops are collected. Leaves petiolate, about 5 centimeters (2 inches) long, silky-hoary, roundish-triangular in outline, twice or thrice pinnatifid, the segments lanceolate, the terminal one spatulate; flower-heads numerous, racemose, small, subglobose, with an imbricated involucre, a small hairy receptacle, tubular yellowish florets, and obovoid akenes; odor aromatic; taste very bitter.

Constituents.—Volatile oil about 1 per cent. (spec. grav. 0.94, freely soluble in alcohol, mainly absinthol, $C_{10}H_{16}O$), absinthin, $C_{40}H_{58}O_9$ (bitter, white, precipitated by tannin, soluble in ether), tannin, resin, succinic acid, etc.

Properties.—Stimulant, tonic, febrifuge, anthelmintic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion, tincture, or extract.

ARTEMISIA.—Mugwort.

Origin.—Artemisia vulgaris, *Linné.* *Natural order*, Compositæ, Senecionideæ.

Habitat.—Asia, Europe, naturalized in North America.

Description.—Stem often reddish, branched; leaves subsessile, green above, white tomentose beneath, pinnatifid, segments lanceolate, acute, incised or entire; flower-heads numerous, small, nearly sessile, ovate, with an imbricated involucre, a small smooth receptacle and tubular reddish florets; odor aromatic; taste bitter.

Constituents.—Volatile oil, bitter principle, tannin, etc.

Properties.—Stimulant, tonic. *Dose*, 1 to 4 grams (gr. xv–ʒj) in infusion.

GNAPHALIUM.—Life Everlasting.

Origin.—Gnaphalium polycephalum, *Michaux.* *Natural order*, Compositæ, Senecionideæ.

Habitat.—North America, in fields and woods.

Description.—Erect, about 25 centimeters (10 inches) high, densely woolly; leaves sessile, lanceolate; flower-heads in dense terminal clusters, small, obovate, with a whitish imbricate involucre and tubular yellowish florets; odor agreeable; taste bitterish, aromatic.

Gnaphalium margaritaceum, *Linné*, has larger, globular-ovate, pearl-white heads and a slight odor.

Constituents.—Volatile oil, bitter principle.

Properties.—Diaphoretic, astringent, tonic. *Dose*, 2 to 4 grams (ʒss–j).

CALENDULA.—MARIGOLD.

Origin.—Calendula officinalis, *Linné*. *Natural order*, Compositæ, Cynareæ.

Habitat.—Levant and Southern Europe; cultivated.

Description.—Stem about 50 centimeters (20 inches) high, somewhat angular, rough; leaves alternate, thickish, hairy, spatulate or oblanceolate, slightly toothed, the upper ones sessile and amplexicaul; involucre hemispherical, receptacle flat, naked; ray-florets in one or several rows, fertile, the akenes incurved and muricate; odor somewhat narcotic; taste bitter and saline.

Constituents.—A trace of volatile oil, amorphous bitter principle, tasteless yellow calendulin, sugar, gum, etc.

Properties.—Stimulant, resolvent, vulnerary, alterative. *Dose*, 0.5 to 1 or 2 grams (gr. viij–xv–xxx), in infusion, tincture, or extract.

CARDUUS BENEDICTUS.—BLESSED THISTLE.

Origin.—Cnicus benedictus, *Gærtner*. *Natural order*, Compositæ, Cynareæ.

Habitat.—Levant and Europe, rare in the United States.

Description.—Erect, somewhat woolly; leaves sessile above and somewhat decurrent, alternate, oblong, sinuately lobed, soft spiny; flower-heads ovate, with an imbricate spinously-pointed involucre, a hispid receptacle, tubular yellow florets and grayish akenes, crowned with ten teeth and with ten long and ten short bristles; taste very bitter.

Constituents.—Cnicin (bitter needles, slightly soluble in cold water and ether), tannin, etc.

Properties.—Diaphoretic, tonic. *Dose*, 1 to 4 grams (gr. xv–ʒj).

LOBELIA.—Lobelia.

Origin.—Lobelia inflata, *Linné. Natural order*, Lobeliaceæ.

Habitat.—North America, in fields and open woods.

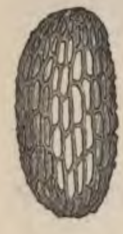
Description.—Erect; leaves alternate, petiolate, the upper sessile, ovate or oblong, about 5 centimeters (2 inches) long, irregularly toothed, pubescent, pale green; branches furrowed, hairy, terminating in long racemes of small pale blue flowers, having a superior narrowly five-toothed calyx, which is inflated in fruit, a pale blue, two-lipped corolla, and 5 united stamens; odor slight, irritating; taste mild, afterward burning and acrid.

The leaves and flowering tops should be collected after a portion of the capsules are ripe, and contain a large number of minute reticulate seeds.

Constituents.—Lobeline (yellow, acrid, oily liquid, altered by heat; salts crystallizable), lobelacrin (probably lobelate of lobeline), lobelic acid (precipitated by copper sulphate, olive-brown by ferric salts), resin, wax, fat, gum.

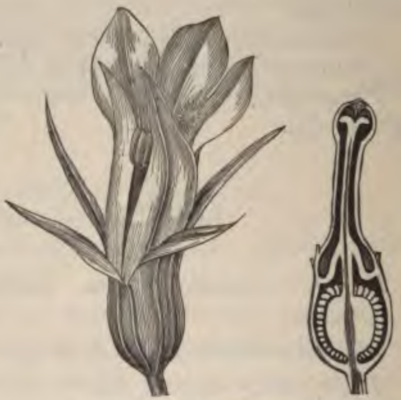
Properties.—Expectorant, nervine, purgative, emetic, narcotic. *Dose*, 0.12, 0.5 to 2 grams (gr. ij–viij–xxx), in powder, infusion, or tincture.

Fig. 162.



Lobelia seed. —Highly magnified.

Fig. 163.



Flower of lobelia and section, magnified 5 diam.

EPIPHEGUS.—BEECHDROP.

Origin.—Epiphegus virginiana, *Barton. Natural order*, Orobanchaceæ.

Habitat.—North America, parasitic upon roots of the beech.

Description.—Erect, branched, about 40 centimeters (16 inches) high, yellowish-brown, tuberous at base, angular above; leaves scaly, ovate; flowers in spicate racemes, the upper sterile ones with a somewhat curved and two-lipped corolla; taste bitter, somewhat astringent.

Constituents.—Bitter principle, tannin.

Properties.—Astringent, depurative. *Dose*, 2 to 4 grams (ʒss–j).

SCROPHULARIA.—Figwort.

Origin. — Scrophularia nodosa, *Linné*. *Natural order*, Scrophulariaceæ.

Habitat. — North America and Europe, in moist thickets.

Description.—Erect, smooth; stem obtusely quadrangular; leaves opposite, petiolate, ovate-oblong or lanceolate, serrate, rounded or heart-shaped at base; inflorescence loosely paniculate; corolla greenish-brown, hemispherical urnshaped, the five teeth short and obtuse. the two upper ones larger and brown, the lowest one spreading; capsule two-celled, many-seeded; taste bitter, nauseous.

Constituents.—Scrophularin (crystalline scales, bitter, precipitated by tannin), tannin, salts, etc.

Properties.—Depurative, vulnerary.

CHELONE.—Balmony.

Origin—Chelone glabra, *Linné*. *Natural order*, Scrophulariaceæ.

Habitat.—North America, in wet places.

Description.—Erect, smooth; leaves short-petiolate, opposite, oblong-lanceolate, pointed, serrate; inflorescence spicate, terminal; corolla about 3 centimeters (1⅕ inch) long, white or pinkish, bilabiate, the upper lip arched, the mouth somewhat gaping; capsule two-celled; seeds many, winged; inodorous, bitter.

Constituents.—Bitter principle.

Properties.—Tonic, laxative, anthelmintic. *Dose*, 2 to 8 grams (ʒss–ij) in decoction.

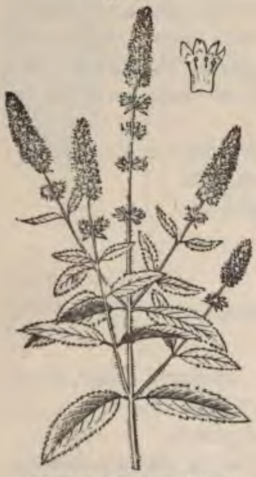
MENTHA PIPERITA.—PEPPERMINT.

Origin.—Mentha piperita. *Linné.* *Natural order*, Labiatæ, Satureieæ.

Habitat.—Wild in Asia, Europe, and North America; cultivated.

Description.—The leaves and tops are collected. Leaves petiolate, ovate-lanceolate, about 5 centimeters (2 inches) long, acute, sharply serrate, glandular, nearly smooth; branches quadrangular, often purplish; flowers in terminal conical spikes, with a tubular, five-toothed, often purplish calyx, a purplish four-lobed corolla, and 4 short stamens; aromatic; taste pungent and cooling.

Fig 164.



Mentha piperita, *Linné.*

Constituents.—Volatile oil about 1 per cent., little tannin, resin, gum, etc. The volatile oil is $C_{10}H_{18}O$, and crystalline menthol, $C_{10}H_{20}O$, has the spec. grav. 0.90, and is freely soluble in alcohol.

Properties.—Carminative, stimulant, nervine, stronger than spearmint. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

MENTHA VIRIDIS.—SPEARMINT.

Origin.—Mentha viridis, *Linné.* *Natural order*, Labiatæ, Satureieæ.

Habitat.—Wild in Europe and North America; cultivated.

Description.—The leaves and flowering tops are collected. Leaves subsessile, lance-ovate, about 5 centimeters (2 inches) long, acute, serrate, glandular, nearly smooth; branches quadrangular, mostly light green; flowers in terminal, interrupted, narrow, acute spikes, with a tubular sharply five-toothed calyx, a light purplish four-lobed corolla, and 4 rather long stamens; aromatic and pungent.

Constituents.—Volatile oil about ½ per cent. (spec. grav. 0.91, freely soluble in alcohol), resin, gum, etc.

Properties.—Carminative, stimulant, nervine. *Dose,* 2 to 4 grams (ʒss–j), in infusion.

LYCOPUS.—Bugle.

Origin.—Lycopus virginicus, *Linné.* *Natural order,* Labiatæ, Satureieæ.

Habitat.—North America, in moist shady places.

Description.—Stem obtusely quadrangular, with slender runners; leaves about 5 centimeters (2 inches) long, short-petioled, elliptic-lanceolate, toothed above, smooth; flowers in axillary clusters, small, with a bluntly four-toothed calyx, a purplish four-lobed corolla, and two stamens; odor somewhat mint-like; taste bitter.

Lycopus europæus, *Linné*, also indigenous to North America, has a sharply quadrangular stem, the leaves sinuate-toothed or pinnatifid at the base, and a sharply five-toothed calyx.

Constituents.—Volatile oil, bitter principle, tannin.

Properties.—Astringent, tonic, sedative. *Dose,* 0.5 to 2 grams (gr. viij–xxx) in infusion.

CUNILA.—DITTANY.

Origin.—Cunila Mariana, *Linné.* *Natural order,* Labiatæ, Satureieæ.

Habitat.—United States, in dry soil.

Description.—Stem thin; leaves nearly sessile, about 25 millimeters (1 inch) long, ovate, serrate, subcordate; flowers in small cymes, with an ovate-tubular calyx, a two-lipped, pale purple corolla, and 2 exserted stamens; odor mint-like; taste pungent aromatic.

Constituents.—Volatile oil.

Properties.—Carminative, stimulant, sudorific. *Dose,* 1 to 4 grams (gr. xv–ʒj), in infusion.

HYSSOPUS.—HYSSOP.

Origin.—Hyssopus officinalis, *Linné.* *Natural order,* Labiatæ, Satureieæ.

Habitat.—Southern Europe; naturalized in the United States; cultivated.

Description.—Stem branched, wand-like; leaves sessile, about 25 millimeters (1 inch) long, linear-lanceolate, rather obtuse; flowers in small clusters, with a five-toothed calyx, a two-lipped, purple corolla, and 4 exserted stamens; aromatic, pungent, bitterish.

Constituents.—Volatile oil about ½ per cent., bitter principle, tannin, etc.

Properties.—Carminative, stimulant, sudorific. *Dose,* 1 to 4 grams (gr. xv–ʒj), in infusion.

ORIGANUM.—WILD MARJORAM.

Origin.—Origanum vulgare, *Linné.* *Natural order,* Labiatæ, Satureieæ.

Habitat.—Asia, Europe, and Northern Africa; naturalized in North America.

Description.—Stem purplish, branched above; leaves petiolate, about 2 centimeters (⅘ inch) long, roundish-ovate, obtuse, nearly entire, hairy beneath; flowers corymbose, with reddish bracts, a five-toothed calyx, a somewhat two-lipped, pale purple corolla, and 4 exserted stamens; aromatic, pungent, bitterish.

Constituents.—Volatile oil about 1 per cent. (spec. grav. 0.89, light yellow, neutral, bitterish, not freely soluble in 80 per cent. alcohol, contains oxygen), tannin, bitter principle, resin.

Properties.—Carminative, stimulant, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

MAJORANA.—Sweet Marjoram.

Origin.—Origanum Majorana, *Linné*. *Natural order*, Labiatæ, Satureieæ.

Habitat.—Asia Minor and Southern Europe; cultivated.

Description.—Stem branched, subterete; leaves sessile above, about 15 millimeters (⅗ inch) long, spatulate or obovate, obtuse, gray-green, soft hairy; flowers in clusters, spicate, with a two-lipped calyx, a whitish, somewhat two-lipped corolla, and 4 exserted stamens; fragrantly aromatic and pungent.

Constituents.—Volatile oil (spec. grav. 0.89, readily soluble in alcohol).

Properties.—Carminative, stimulant, emmenagogue, cephalic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

SERPYLLUM.—Wild Thyme.

Origin.—Thymus Serpyllum, *Linné*. *Natural order*, Labiatæ, Satureieæ.

Habitat.—Northern Asia, Europe; naturalized in North America; cultivated.

Description.—Stem branched, pubescent; leaves short-petioled, about 6 millimeters (¼ inch) long, ovate, obtuse, entire; flowers in small capitate spikes, with a two-lipped calyx, a purplish spotted, somewhat two-lipped corolla, and four usually short stamens; aromatic and pungent.

Constituents.—Volatile oil (spec. grav. 0.91, readily soluble in alcohol), tannin, bitter principle.

Properties.—Carminative, stimulant, tonic, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

MELISSA.—BALM.

Origin.—Melissa officinalis, *Linné*. *Natural order*, Labiatæ, Satureieæ.

Habitat.—Asia Minor, Southern Europe; naturalized in the United States; cultivated.

Description.—Stem branched, pubescent; leaves petiolate, ovate, about 5 centimeters (2 inches) long, obtuse, crenate-serrate, somewhat hairy, glandular; branches quadrangular; flowers in about four-flowered cymules, with a tubular bell-shaped five-toothed calyx, a whitish or purplish two-lipped corolla, and four didynamous stamens; fragrant, aromatic, and bitterish.

Constituents.—Volatile oil (spec grav. 0.89, soluble in alcohol), tannin, bitter principle.

Properties.—Carminative stimulant, diaphoretic, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

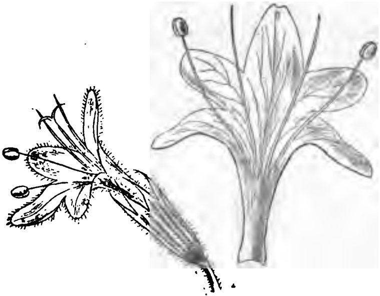
HEDEOMA.—PENNYROYAL.

Origin.—Hedeoma pulegioides, *Persoon*. *Natural order*, Labiatæ, Satureieæ.

Habitat.—North America, in sandy fields.

Description.—Stem subterete, hairy; leaves opposite, short-petioled, about 12 millimeters (½ inch) long, oblong-ovate, obscurely serrate, glandular beneath; flowers in small roundish axillary cymules, with a tubular-ovoid, two-lipped and five-toothed calyx, and a small pale blue, pubescent, two-lipped corolla, containing two sterile and two fertile exserted stamens; odor strong, mint-like; taste warm and pungent.

Fig 165.



Flower and corolla of hedeoma, magnified.

Constituents.—Volatile oil, spec. grav. 0.94, readily soluble in alcohol.

Properties.—Carminative, stimulant, emmenagogue. *Dose,* 1 to 4 grams (gr. xv–ʒj), in infusion.

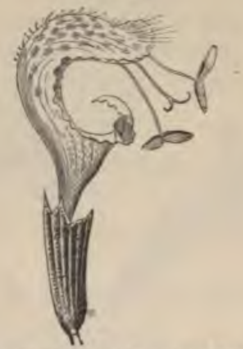
MONARDA.—HORSEMINT.

Origin.—Monarda punctata, *Linné.* *Natural order,* Labiatæ, Monardeæ.

Habitat.—United States, in sandy fields.

Description.—Stem nearly simple; leaves petiolate, lanceolate, about 5 centimeters (2 inches) long, acute, somewhat toothed, glandular, nearly smooth; flowers whorled, with sessile yellow and purple bracts, a tubular, downy, five-toothed calyx, a prominent, two-lipped, pale yellow and purple-spotted corolla, and two stamens; aromatic, pungent, and bitterish.

Fig. 166.



Flower of monarda, magnified.

Constituents.—Volatile oil, yellowish or reddish-brown, neutral, spec. grav. 0.92, readily soluble in alcohol, contains thymol.

Properties. — Carminative, stimulant, nervine, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

CATARIA.—Catnep.

Origin.—Nepeta Cataria, *Linné*. *Natural order*, Labiatæ, Nepeteæ.

Habitat.—Asia, Europe, naturalized in the United States.

Description.—Stem branched, hairy, gray; leaves petiolate, about 5 centimeters (2 inches) long, triangular-ovate, cordate, crenate-serrate, grayish-green, and hairy; flowers in terminal panicles with an obliquely five-toothed calyx, a two-lipped, whitish, purple-spotted corolla, and 4 stamens; it has a peculiar, somewhat mint-like odor, and a bitterish, aromatic, and pungent taste.

Constituents.—Little volatile oil, tannin, bitter principle.

Properties—Carminative, stimulant, tonic, diaphoretic, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

GLECHOMA.—GROUND-IVY.

Origin.—Glechoma hederacea, *Linné.* (Nepeta Glechoma, *Bentham.*) *Natural order*, Labiatæ, Nepeteæ.

Habitat.—Europe, naturalized in the United States.

Description.—Creeping, short-hairy; leaves petiolate, round-reniform, crenate, nearly smooth; flowers in axillary cymules; corolla blue or purplish, much longer than the calyx; somewhat aromatic and bitter.

Constituents.—Volatile oil, bitter principle, etc.

Properties.—Pectoral, tonic, diuretic. *Dose*, 2 to 4 grams (ʒss–j).

MARRUBIUM.—HOREHOUND.

Origin.—Marrubium vulgare, *Linné.* *Natural order*, Labiatæ, Stachydeæ.

Habitat.—Europe, Central Asia; naturalized in North America; cultivated.

Description.—Stem branched, white tomentose; leaves opposite, petiolate, roundish-ovate, about 25 millimeters (1 inch) long, obtuse, coarsely crenate, downy above, white hairy beneath; flowers in dense axillary woolly whorls, with a stiffly ten-toothed calyx, a whitish bilabiate corolla and four included stamens; aromatic and bitter.

Constituents.—Little volatile oil, tannin, resin, marrubiin (crystalline, soluble in ether, alcohol, and hot water, not precipitated by tannin, bitter).

Properties.—Stimulant, tonic, resolvent, deobstruent, anthelmintic. *Dose*, 1 to 2 grams (gr. xv–xxx), in infusion.

SCUTELLARIA.—SKULLCAP.

Origin.—Scutellaria lateriflora. *Linné. Natural order*, Labiatæ, Stachydeæ.

Habitat.—North America, in damp thickets.

Description.—Stem about 50 centimeters (20 inches) high, smooth, branched; leaves opposite, about 5 centimeters (2 inches) long, petiolate, lance-ovate or ovate-oblong, serrate; flowers in axillary one-sided racemes; corolla pale blue; calyx closed in fruit, upper lip helmet-shaped; odor slight; taste bitterish.

The following species having a more decidedly bitter taste are sometimes collected; they are indigenous to North America, and have a nearly simple stem and blue flowers:

Sc. integrifolia, *Linné.* Minutely hairy; leaves short-petioled, lance-oblong or linear-oblong, entire; racemes terminal.

Sc. pilosa, *Linné.* Hairy; leaves petiolate, rhombic-ovate or oblong-ovate, obtuse, crenate, in distant pairs; racemes terminal.

Sc. galericulata, *Linné.* Nearly smooth; leaves short-petioled, lance-ovate, slightly cordate, crenately serrate; flowers axillary, single.

Constituents.—Bitter principle, tannin, volatile oil.

Properties.—Tonic, nervine, antispasmodic. *Dose*, 2 to 4 or 8 grams (ʒss–j–ij), in infusion or fluid extract.

LEONURUS.—MOTHERWORT.

Origin.—Leonurus Cardiaca, *Linné. Natural order*, Labiatæ, Stachydeæ.

Habitat.—North America, Europe, and Asia, in waste places.

Description.—Erect, roughish; leaves petiolate, the lower ones roundish or heart-shaped, the upper ones oblong wedge-shaped, all palmately acutely seven- to three-lobed; flowers in dense axillary cymules; calyx spinously five-toothed; corolla exserted, rose-colored, upper lip bearded, lower lip dotted; odor unpleasant; taste bitter.

Constituents.—Volatile oil, bitter principle.

Properties.—Pectoral, tonic, stimulant. *Dose*, 2 to 4 grams (ʒss–j), in infusion.

PLANTAGO.—PLANTAIN.

Origin.—Plantago lanceolata and P. major, *Linné Natural order*, Plantaginaceæ.

Habitat.—North America, along roadsides and in grassy places; introduced from Europe.

Description.—Leaves all radical, petiolate, nerved, somewhat toothed, more or less hairy, lanceolate, or of the second species ovate or elliptic; scape with a dense ovate-oblong or, in the second species, cylindrical spike; corolla whitish, membranous, salver-form, four-lobed; stamens 4 exserted; capsule few seeded; inodorous; somewhat bitter and astringent.

Constituents.—Bitter principle, tannin, salts.

Properties.—Mild astringent, hemostatic; the seeds demulcent.

MITCHELLA.—Squaw Vine.

Origin.—Mitchella repens, *Linné.* *Natural order,* Rubiaceæ, Coffeæ.

Habitat.—North America, in woods.

Description.—Evergreen, slender, creeping; leaves opposite, petiolate, roundish-ovate, entire, smooth; flowers in pairs; corolla salver-form, four-lobed, white or pink, bearded inside, fragrant; fruit a twin-berry, bright red, four-seeded; taste somewhat astringent and bitter. No analysis.

Properties.—Tonic, astringent, diuretic. *Dose,* 2 to 4 grams (ʒss–j).

GALIUM.—Cleavers.

Origin.—Galium Aparine, *Linné.* *Natural order,* Rubiaceæ, Stellatæ.

Habitat.—Northern Hemisphere, in thickets.

Description.—Stem weak, climbing, quadrangular, retrorsely prickly; leaves in whorls of 6 or 8, linear-oblanceolate, mucronate, margin and midrib rough; cymes loose and few flowered; corolla small, white, rotate, four-lobed; stamens 4; fruit two-seeded, covered with hooked bristles; inodorous; taste saline, somewhat astringent and bitter.

Galium trifolium, *Michaux,* has whorls of 6 elliptic-lanceolate leaves, and becomes fragrant from coumarin on drying.

Constituents.—Tannin, various salts.

Properties.—Diuretic, refrigerant. *Dose,* 2 to 4 grams (ʒss–j), in infusion.

SABBATIA.—SABBATIA; CENTAURY.

Origin.—Sabbatia angularis, *Pursh*, and S. paniculata, *Pursh*. *Natural order*, Gentianaceæ.

Habitat.—United States, in dry fields.

Description.—Stem branched above, winged, quadrangular, about 60 centimeters (2 feet) high, smooth; leaves opposite, about 25 millimeters (1 inch) long, clasping, oblong-ovate, acute, entire, five-nerved, or (Sab. paniculata) linear-oblong, obtuse, and one-nerved; corolla whitish, wheel-shaped or five-parted; stamens 5; inodorous, bitter.

Sabbatia Elliottii, *Steudel*, quinine-flower, has leaves about 12 millimeters (½ inch) long, varying between obovate and linear.

Erythræa Centaurium, *Persoon*, European centaury. Stem 30 centimeters (12 inches) high, leaves oval or ovate-oblong, obtuse, three- to five-nerved; otherwise resembling the preceding.

Constituents. — Bitter principle, erythrocentaurin, $C_{27}H_{24}O_8$ (tasteless, colored red by light).

Properties.—Tonic, febrifuge. *Dose*, 1 to 4 grams (gr. xv–ʒj) in decoction.

CHIRETTA.—CHIRETTA.

Origin.—Ophelia Chirata, *Grisebach*, s. Agathotes Chirayta, *Don*. *Natural order*, Gentianaceæ.

Habitat.—Mountains of Northern India.

Description.—Root nearly simple, about 75 millimeters (3 inches) long; stem branched, nearly 1 meter (40 inches) long, slightly quadrangular above; leaves opposite, sessile, ovate, entire, five-nerved; flowers numerous, small, with a four-lobed calyx and corolla; the whole plant smooth, pale brown, inodorous, and intensely bitter.

Constituents.—Ophelic acid, $C_{13}H_{20}O_{10}$ (bitter, amorphous, viscid), chiratin, $C_{26}H_{48}O_{15}$ (bitter, crystalline, precipitated by tannin, glucoside).

Properties.—Tonic, febrifuge. *Dose*, 1 to 3 grams (gr. xv–xlv), in infusion.

CANNABIS INDICA.—INDIAN HEMP, GUNJA.

Origin.—Cannabis sativa, *Linné.* *Natural order*, Urticaceæ, Cannabineæ.

Habitat.—Asia, collected in India.

Description.—Only the flowering tops of the female plant are collected. About 5 centimeters (2 inches) long, compressed, brittle, branching, with few digitate leaves and lance-linear leaflets, and numerous sheathing and pointed bracts, each containing two small pistillate flowers, sometimes with the nearly ripe fruit, the whole more or less agglutinated with a resinous exudation; it has a brownish-green color, a peculiar narcotic odor. and a slightly acrid taste.

Cannabis americana.—The hemp plant grown in the Southern United States. Stem 2 or 3 meters (6 to 10 feet) high, rough; leaves alternate above, petiolate, digitate, the leaflets linear-lanceolate, serrate; staminate flowers in loose pedunculate clusters, forming compound racemes; pistillate flowers small, mostly in pairs, axillary, sessile, bracteate and with two slender unequal styles; odor heavy; taste bitter; slightly acrid.

Constituents.—Little volatile oil, brown amorphous resin, cannabinine, tetanocannabine. American hemp contains a small proportion of resin.

Properties.—Anodyne, nervine, sudorific. *Dose*, 0.5 to 1 gram (gr. viij–xv), mostly as extract, 0.03 to 0.20 gram (gr. ss–iij).

8. LEAFY TOPS.—CACUMINA, SUMMITATES.

Among the herbs are included the tops of plants which are usually collected with flowers. The present division embraces a few drugs having imbricated leaves, and collected occasionally with the fruit, but never with the flowers. The plants yielding these drugs are trees of the natural order Coniferæ, group Cupressineæ.

Twigs quadrangular, oil-gland near the base of the leaves.	Juniperus virginiana.
the leaves with an oil-gland on the back.	Sabina.
Twigs two-edged, the flat leaves with a gland on the back.	Thuja.

JUNIPERUS VIRGINIANA.—RED CEDAR.

Origin.—Juniperus virginiana, *Linné. Natural order*, Coniferæ.

Description.—About 25 millimeters (1 inch) long, somewhat quadrangular; leaves in four rows, opposite, scale-like, appressed, imbricated, lance-ovate or rhomboid, the older ones sharply acute and spreading, on the back with a longitudinal furrow and near its base a circular or oblong gland; odor terebinthinate; taste balsamic, bitterish, and acrid.

Constituents.—Volatile oil (chiefly $C_{15}H_{24}$, not readily soluble in alcohol), resin, tannin, etc.

Properties.—Diuretic, emmenagogue, vermifuge, less irritant than savine. *Dose*, 0.2 to 0.5 or 1 gram (gr. iij–viij–xv), in powder or infusion.

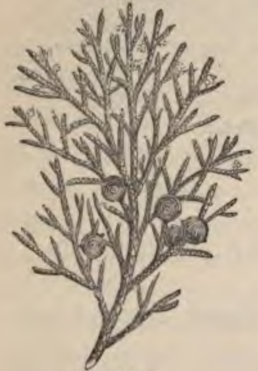
SABINA.—SAVINE.

Origin.—Juniperus Sabina, *Linné.* *Natural order*, Coniferæ.

Habitat.—Siberia, Europe, Canada, and Northern United States.

Description.—Short, thin, subquadrangular branchlets; leaves in four rows opposite, scale-like, appressed, imbricated, rhombic-lanceolate, the older ones sharply acute and spreading, on the back with a shallow groove containing an oblong or roundish gland; odor terebinthinate; taste nauseous, resinous and bitter.

Fig. 167.



Sabina.

Constituents.—Volatile oil, $C_{10}H_{16}$, about 2 per cent., resin, tannin. The volatile oil is of spec. grav. 0.91, and not readily soluble in alcohol.

Properties.—Irritant, diuretic, hæmagogue, emmenagogue, vermifuge. *Dose*, 0.2 to 0.5 or 1 gram (gr. iij–viij–xv) in powder, infusion, or fluid extract.

THUJA.—ARBOR VITÆ.

Origin.—Thuja occidentalis, *Linné.* *Natural order*, Coniferæ.

Habitat.—Canada and Northern United States; cultivated.

Description.—Twigs flattish, two-edged, the scale-like leaves appressed and closely imbricated in four rows, rhombic-ovate, obtusely pointed, the flat ones with a roundish gland upon the back, the others folded lengthwise and boat-shaped, of a basalmic, somewhat terebinthinate odor, and a pungently aromatic camphoraceous, and bitter taste.

Constituents.—Volatile oil about 1 per cent. (readily soluble in alcohol, contains O), resin, tannin, pinipicrin, $C_{22}H_{18}O_{11}$ (yellow, bitter), thujin, $C_{20}H_{22}O_{12}$ (crystalline, astringent, dark green with ferric salts).

Properties.—Stimulant, diuretic, irritant. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion and fluid extract.

9. FLOWERS AND PETALS.—FLORES ET PETALA.

Flowers contain the male or female, or both kinds, organs of reproduction, surrounded by two circles of modified leaves, of which those of the inner circle, the petals forming the corolla, very generally have a color different from green, while those of the outer circle, the sepals forming the calyx, mostly have a green color. The modified leaves of these two whorls are sometimes of the same shape and color, or one of the whorls is entirely wanting; in both these cases they, whether green or of a different color, are called prerianth or perigone. The flowers of some plants are placed close together upon a common receptacle, and such a head is surrounded by one or more whorls of modified, frequently scale-like leaves called the involucre, a term which is also employed to designate the whorl of modified leaves found outside of the calyx of each flower in certain plants. The male organs of reproduction, or stamens, consist each of a filament which is usually thin and filiform, and bears at its apex the mostly two-celled anther; in the cells of the latter the pollen is contained. The female organ of reproduction consists of one or more ovules inclosed by one or more carpels (modified leaves) forming the ovary, and frequently prolonged above into a style bearing the stigma. In the absence of the style, the stigma is attached to the ovary, and is said to be sessile. The shortened axis upon which the organs of reproduction are attached is the torus, also called the receptacle. The footstalk of a flower is called the peduncle, and its branches, the pedicles.

Classification.

I. Buds, unexpanded flowers.	
Calyx superior, four-cleft.	Caryophyllus.
Small heads with an imbricated involucre.	Santonica.
II. Expanded flowers and petals.	
1. Petals distinct; corolla polypetalous.	
Calyx inferior, corolla white, ovary one.	Aurantium.
Inflorescence cymose; the peduncle partly united with a leafy bract.	Tilia.
Inflorescence paniculate; sepals 5, reddish; petals small.	Brayera.
Petals numerous, clawed, rose-colored.	Rosa centifolia.
deep red.	Rosa gallica.
Petals short-clawed, dull purple, with a black spot.	Rhœas.
2. Petals united; corolla gamopetalous.	
Flowers compound, rays white; receptacle conical, hollow.	Matricaria.

rays white, in many rows; receptacle conical, not hollow.	Anthemis.
rays yellow; pappus bristly.	Arnica.
akenes curved, pappus none.	Calendula.
Florets tubular, five-lobed, brownish-red.	Carthamus.
Flowers not compound; corolla whitish, wheel-shaped, five-lobed.	Sambucus.
corolla wheel-shaped, five-lobed, yellow.	Verbascum.
corolla blue, two-lipped; calyx blue-gray, five-toothed.	Lavandula.

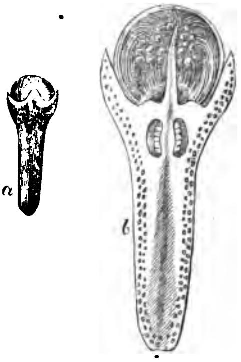
CARYOPHYLLUS.—Cloves.

Origin.—Eugenia caryophyllata, *Thunberg*, s. Caryophyllus aromaticus, *Linné*. *Natural order*, Myrtaceæ.

Habitat.—Molucca Islands; cultivated in tropical countries.

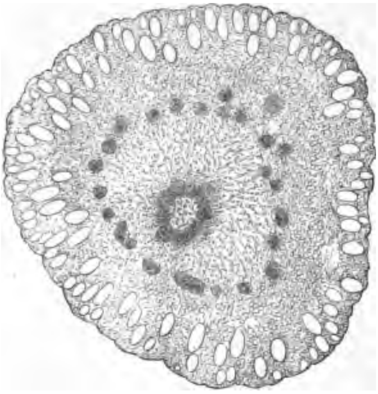
Description.—About 12 millimeters ($\frac{1}{2}$ inch) long,

Fig. 168.



Caryophyllus.—*a*. Natural size, *b*. Longitudinal section magnified.

Fig. 169.



Clove.—Transverse section, magnified 15 diams.

dark brown, consisting of a subcylindrical, solid, and glandular calyx-tube, terminated by four teeth, and surmounted by a globular head, formed by four glandular petals, which cover numerous curved stamens and one style. Cloves contain numerous oil-glands under the epidermis, emit oil when scratched, and have a strong aromatic odor and a pungent spicy taste.

Constituents.—Volatile oil 18 per cent., tannin 13 per cent., gum 13 per cent., resin 6 per cent. (tasteless), wax, caryophyllin, $C_{10}H_{16}O$ (white, tasteless needles), eugenin, $C_{10}H_{12}O_2$ (pearly scales from distillate). The volatile oil is readily soluble in alcohol, and consists of a hydrocarbon, $C_{10}H_{16}$, spec. grav. 0.91, and eugenol or eugenic acid, $C_{10}H_{12}O_2$, a colorless oil, spec. grav. 1.076.

Properties.—Stimulant, stomachic, antiemetic. *Dose*, 0.2 to 0.5 gram (gr. iij–viij), in powder; mostly used as a condiment.

SANTONICA.—Santonica, Levant Wormseed.

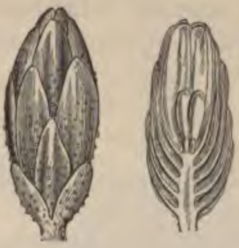
Origin.—Artemisia maritima, *Linné*, *var.* Stechmanniana, *Besser*. *Natural order*, Compositæ, Senecionideæ.

Habitat.—Turkestan.

Description.—Unexpanded flower-heads, oblong-ovoid, about 2 millimeters ($\frac{1}{12}$ inch) long, obtuse, smooth, somewhat glossy, grayish-green, after exposure to light brownish-green, with an involucre of about 18 closely imbricated glandular scales, inclosing 4 or 5 rudimentary florets; odor strong, peculiar, somewhat camphoraceous; taste aromatic and bitter.

Constituents.—Volatile oil 1 per cent., santonin 1½–2 per cent., resin, gum, etc. Santonin, $C_{15}H_{18}O_3$, is white crystalline, nearly insoluble in cold water, colored yellow in sunlight, forms with alkalies bitter soluble compounds.

Fig. 170.



Santonica.—Head and longitudinal section, magnified 10 diam.

Properties.—Stimulant, anthelmintic. *Dose*, 1 to 4 grams (gr. xv–ʒj), in powder or electuary; santonin, 0.016 to 0.06 gram (gr. ¼–j), in powder or troches.

AURANTII FLORES.—ORANGE FLOWERS.

Origin.—Citrus vulgaris and Citrus Aurantium, *Risso*. *Natural order*, Aurantiaceæ.

Habitat.—Northern India; cultivated in subtropical countries.

Description.—The partly expanded flowers are collected and mostly used in the fresh state. About 12 millimeters (½ inch) long; calyx small, cup-shaped, five-toothed; petals 5, oblong, obtuse, rather fleshy, white, and glandular punctate; stamens numerous, in about three sets; ovary globular, upon a small disk, with a cylindrical style and globular stigma; odor very fragrant; taste aromatic, somewhat bitter.

When it is desirable to keep orange flowers for some time, they may be preserved by being well mixed with half their weight of chloride of sodium.

Constituents.—Volatile oil (spec. grav. 0.89, fluorescent with alcohol), mucilage, bitter extractive.

Properties.—Stimulant, antispasmodic; used for preparing orange-flower water.

TILIA.—LINDEN FLOWERS.

Origin.—Tilia americana, *Linné*, and T. platyphylla, *Ventenat.* *Natural order*, Tiliaceæ.

Habitat.—North America.

Description.—Cymes varying between about three- and thirty-flowered, the long peduncle partly united to an oblong-lanceolate bract, which is about 75 millimeters (3 inches) long, and 12 millimeters (½ inch) wide; calyx five-parted; petals 5, yellowish, notched, at the base with a large scale; petals numerous, hypogynous, in 5 groups united with the petaloid scales; ovary five-celled; stigma five-lobed; odor agreeable, taste sweet, mucilaginous.

Tilia ulmfolia, *Scopoli*, indigenous to Europe, cultivated in the United States, has seven-flowered cymes and the petals without scales.

Constituents.—Volatile oil, mucilage, sugar, tannin.

Properties.—Diaphoretic, stimulant, lenitive. *Dose*, 1 to 2 grams (gr. xv–xxx).

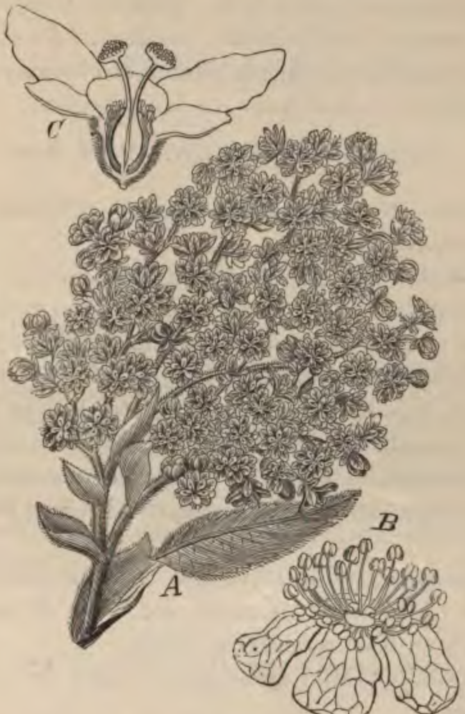
BRAYERA.—KOOSSO.

Origin.—Brayera anthelmintica, *Kunth* (Hagenia abyssinica, *Willdenow*). *Natural order*, Rosaceæ, Roseæ.

Habitat.—Abyssinia.

Description.—The female inflorescence is collected. In rolls, or compressed bundles, consisting of panicles about 25 centimeters (10 inches) long, with a sheathing bract at the base of each branch; the two roundish bracts at the base of each flower and the five obovate outer sepals are of a reddish color, membranous, and

Fig. 171.



Brayera anthelmintica, *Kunth.*—*A.* Branch of panicle. *B.* Staminate flower, and *C.* pistillate flower, magnified 4 diam.

veiny; calyx top-shaped, hairy, inclosing two carpels or nutlets; odor slight tea-like; taste bitter and nauseous.

Constituents.—Tannin 24 per cent., bitter acrid resin 6¼ per cent., tasteless resin, ash 15 per cent. Kosin or koussin is yellow, crystalline, tasteless, fusible, insoluble in water.

Properties.—Anthelmintic, tænifuge. *Dose*, 16 to 24 or 32 grams (ʒiv–vj–℥j), in powder or electuary.

ROSA CENTIFOLIA.—PALE ROSE.

Origin.—Rosa centifolia, *Linné.* *Natural order*, Rosaceæ, Roseæ.

Habitat.—Western Asia; cultivated.

Description.—The petals are collected. Roundish-obovate and retuse, or obcordate, pink, fragrant, sweetish, slightly bitter, and faintly astringent.

When it is desirable to keep fresh pale rose for some time, it should be preserved by being intimately mixed with one-half its weight of chloride of sodium, pressing the mixture into a suitable jar, and keeping it in a cool place.

Constituents.—Little volatile oil, mucilage, sugar, tannin (quercitrin ?), malates, etc. Oil of rose is obtained from Rosa damascena, *Miller.*

Properties.—Mild carminative; used for preparing rosewater.

ROSA GALLICA.—RED ROSE.

Origin.—Rosa gallica, *Linné.* *Natural order*, Rosaceæ, Roseæ.

Habitat.—Asia Minor and Southern Europe; cultivated.

Description.—The petals are collected before the flowers are expanded. Small cones, consisting of numerous imbricated, roundish, retuse, deep purple-colored, yellow-clawed petals, having a roseate odor and a bitterish, slightly acidulous, and distinct astringent taste.

Constituents.—Volatile oil a trace, mucilage, sugar, quercitrin.

Properties.—Tonic, mild astringent. *Dose*, 1 to 4 grams (gr. xv–ʒj), in powder, confection, or infusion.

RHŒAS.—RED POPPY.

Origin.—Papaver Rhœas, *Linné.* *Natural order*, Papaveraceæ.

Habitat.—Asia and Europe, in fields.

Description.—Petals roundish, about 5 centimeters (2 inches) broad, somewhat shorter, below contracted into a short blackish claw, thin, brownish-purple (fresh scarlet-red); odor slight; taste mucilaginous and bitterish.

Constituents.—Rhœadine a trace, rhœadic and papaveric acids (red coloring matters), gum, etc.

Properties.—Demulcent, mildly anodyne, used chiefly for coloring mixtures.

MATRICARIA.—GERMAN CHAMOMILE.

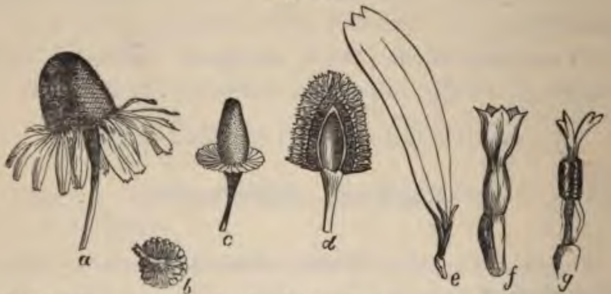
Origin.—Matricaria Chamomilla, *Linné.* *Natural order*, Compositæ, Senecionideæ.

Habitat.—Europe and Asia.

Description.—About 12 millimeters (½ inch) broad, composed of a flattish imbricated involucre, a conical hollow naked receptacle, about 15 white ligulate, three-toothed, reflexed ray florets, and numerous yellow, tubular, perfect flowers without pappus; strongly aromatic and bitter.

The similar flower-heads of Anthemis arvensis, *Linné*, and Maruta Cotula, *De Candolle*, have a conical chaffy receptacle.

Fig. 172.



Matricaria.—*a*. Flower-head. *b*. Involucre. *c*. Receptacle and involucre. *d*. Longitudinal section of receptacle, with disk florets. *e*. Ray floret. *f*. Disk floret. *g*. Stamens and style of disk floret.

Constituents.—Volatile oil ¼ per cent. (dark blue, soluble in alcohol), anthemic acid (bitter needles), anthemidin (tasteless), extractive, little tannin, malates, etc.

Properties.—Stimulant, mild tonic, carminative, nervine, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion.

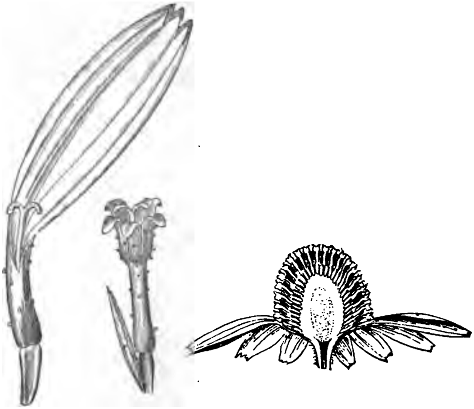
ANTHEMIS.—CHAMOMILE.

Origin.—Anthemis nobilis, *Linné*. *Natural order*, Compositæ, Senecionideæ.

Habitat.—Southern and Western Europe; cultivated.

Description.—Collected from cultivated plants. Subglobular, about 2 centimeters ($\frac{4}{5}$ inch) broad, consisting of an imbricated involucre, numerous white, pistillate, strap-shaped, three-toothed florets, and a few yellow, tubular disk florets inserted upon a chaffy, conical, solid receptacle; odor strong and pleasant; taste aromatic, bitter.

Fig. 173.



Anthemis nobilis.—Ray and disk floret, magnified 4 diam. Section through single flower-head.

Constituents.—Volatile oil (blue, green, or yellow, spec. grav. 0.90, soluble in alcohol, contains isobutylic and isamylic ethers), bitter principle (anthemic acid?), resin, little tannin, etc.

Properties.—Stimulant, tonic, carminative, nervine, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion or fluid extract.

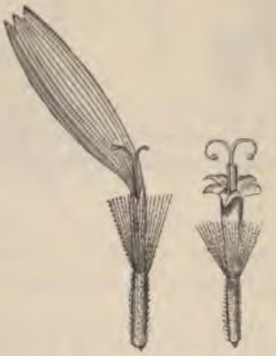
ARNICA.—Arnica Flowers.

Origin.—Arnica montana, *Linné.* *Natural order*, Compositæ, Senecionideæ.

Habitat.—Europe, Northern Asia, and Northwestern America, in mountainous districts.

Description.—Depressed roundish, about 25 millimeters (1 inch) broad, consisting of a scaly involucre in two rows, and a flat, pitted, and chaffy receptacle, bearing about 16 yellow, strap-shaped, veined and three-toothed pistillate ray florets and numerous yellow, five-toothed tubular disk florets, having slender, spindle-shaped akenes crowned with a hairy pappus; feebly aromatic; acrid and bitter.

Fig. 174.



Arnica montana.—Ray and disk floret.

Constituents.—Volatile oil a trace, resin, arnicin (amorphous, yellow, acrid), etc.

Properties.—Stimulant, diuretic, vulnerary, irritant. *Dose*, 0.3 to 1 gram (gr. v–xv), in infusion; mostly used externally as tincture.

CALENDULA.—MARIGOLD.

Origin.—Calendula officinalis, *Linné*. *Natural order*, Compositæ, Cynareæ.

Habitat.—Levant and Southern Europe; cultivated.

Description.—Flower-heads about 5 centimeters (2 inches) broad, with the involucral scales in two rows and equal, a flat and naked receptacle, yellow florets, and incurved, muricate akenes without pappus; the disk florets tubular, five-toothed, and staminate; the ray florets in one or occasionally in several rows, pistillate, ligulate, about 18 millimeters ($\frac{3}{4}$ inch) long, veined, and three-toothed; odor slightly narcotic; taste bitter, somewhat saline. Frequently the strap-shaped ray florets alone are collected.

Constituents.—Amorphous bitter principle, tasteless yellow calendulin, sugar, gum, etc.

Substitutions.—The flower-heads of Tagetes erecta and Tag. patula, *Linné*, cultivated as French or African marigold, have a tubular involucre, yellow or variegated broad ray florets, and straight slender flattish akenes with a chaffy pappus.

Properties.—Stimulant, resolvent, vulnerary. *Dose*, 0.5 to 1 gram (gr. viij–xv), in infusion, tincture, or extract.

CARTHAMUS.—Safflower.

Origin.—Carthamus tinctorius, *Linné*. *Natural order*, Compositæ, Cynareæ

Habitat.—India, cultivated.

Description.—The tubular florets are collected. Cylindrical, about 2 centimeters ($\frac{4}{5}$ inch) long, five-lobed; lobes nearly linear; tube of the anthers protruding from the throat, and surmounted by the two-cleft style; brownish-red; odor slight; taste insipid, bitterish.

Constituents.—Carthamin (red-brown, with metallic lustre, insoluble in ether), mucilage, etc.

Properties.—Diaphoretic, tonic, laxative. *Dose*, 0.5 to 1 gram (gr. viij–xv) in infusion.

SAMBUCUS.—Elder.

Origin —Sambucus canadensis, *Linné*. *Natural order*, Caprifoliaceæ.

Habitat.—North America, in damp places.

Description.—In large corymbose five-rayed cymes; calyx superior, minutely five-toothed; ovary three-celled, three ovuled, and with 3 sessile stigmas; corolla cream-colored, after drying yellowish, wheel-shaped, five-lobed, and on the short tube with five stamens, of a peculiar fragrance and slightly bitter taste.

Elder should be collected in dry weather, rapidly dried, and deprived of the stalks.

The flowers of Sambucus nigra, *Linné*, the European elder, closely resemble the preceding.

Constituents.—Volatile oil a trace, little resin, mucilage, sugar, etc.

Properties.—Stimulant, carminative, diaphoretic. *Dose*, 2 to 4 grams (ʒss–j), in infusion.

VERBASCUM.—MULLEIN.

Origin.—Verbascum phlomoïdes, *Linné.* 2. V. thapsiforme, *Schrader.* 3. V. Thapsus, *Linné.* *Natural order*, Scrophulariaceæ.

Habitat.—Europe, in fields; No. 3 naturalized in North America.

Description.—The five-lobed calyx is often rejected. Corolla wheel-shaped, 25 to 38 millimeters (1 to 1½ inch) broad; lobes five, roundish-obovate; bright yellow, smooth above, stellately hairy beneath; stamens in the short tube five, three filaments white-woolly and two naked; the corolla of No. 3 about 12 millimeters (½ inch) broad; odor slight, honey-like; taste mucilaginous and sweet.

Constituents.—Volatile oil a trace, mucilage, sugar, etc.

Properties.—Demulcent, pectoral. *Dose*, 1 to 4 grams (gr. xv–ʒj).

LAVANDULA.—LAVENDER.

Origin.—Lavandula vera, *De Candolle.* *Natural order*, Labiatæ, Ocymoideæ.

Habitat.—Southern Europe; cultivated.

Description.—Bracts rhombic-ovate, pointed, brownish, and glandular; calyx tubular, blue-gray, hairy, five-toothed, the upper tooth largest and roundish-rhomboid; corolla violet-blue, hairy and glandular on the outside, tubular, and two-lipped, the upper lip two-lobed, the lower lip three-lobed; stamens four, short, on the corolla-tube; odor fragrant; taste bitterish aromatic, somewhat camphoraceous.

When it is desirable to keep orange flowers for some time, they may be preserved by being well mixed with half their weight of chloride of sodium.

Constituents.—Volatile oil (spec. grav. 0.89, fluorescent with alcohol), mucilage, bitter extractive.

Properties.—Stimulant, antispasmodic; used for preparing orange-flower water.

TILIA.—LINDEN FLOWERS.

Origin.—Tilia americana, *Linné*, and T. platyphylla, *Ventenat*. *Natural order*, Tiliaceæ.

Habitat.—North America.

Description.—Cymes varying between about three- and thirty-flowered, the long peduncle partly united to an oblong-lanceolate bract, which is about 75 millimeters (3 inches) long, and 12 millimeters (½ inch) wide; calyx five-parted; petals 5, yellowish, notched, at the base with a large scale; petals numerous, hypogynous, in 5 groups united with the petaloid scales; ovary five-celled; stigma five-lobed; odor agreeable, taste sweet, mucilaginous.

Tilia ulmfolia, *Scopoli*, indigenous to Europe, cultivated in the United States, has seven-flowered cymes and the petals without scales.

Constituents.—Volatile oil, mucilage, sugar, tannin.

Properties.—Diaphoretic, stimulant, lenitive. *Dose*, 1 to 2 grams (gr. xv–xxx).

BRAYERA.—KOOSSO.

Origin.—Brayera anthelmintica, *Kunth* (Hagenia abyssinica, *Willdenow*). *Natural order*, Rosaceæ, Roseæ.

Habitat.—Abyssinia.

the style or its remnants, or are marked with a scar where the style had been attached; a second scar is found at the base of the fruit, where it had been connected with the foot-stalk or attached to the floral axis.

With few exceptions, the officinal fruits consist of fructified simple pistils; the exceptions are two aggregate fruits (staranise and raspberry), composed of several carpels belonging to one flower; one anthocarpous fruit (rose hip), composed of a fleshy receptacle inclosing several akenes; and a few collective fruits, produced by the aggregation of several or many flowers.

Classification.

Sect. 1. Collective fruits.	
Berry-like, containing three seeds with oil-glands.	Juniperus.
Cylindrical spikes of numerous coalesced berry-like fruits; peppery.	Piper longum.
Oblong-conical spikes; fleshy, sweet, and acidulous.	Morus.
Glandular strobiles with akenes at the base of the leafy bracts.	Humulus.
Pear-shaped fleshy receptacle with numerous akenes upon the inner surface.	Ficus.
Sect. 2. Fruits of single flowers.	
I. Pitcher-shaped fleshy receptacle containing akenes.	Rosa canina.
II. Small drupes and berries, about the size of pepper; superior.	
Ten-celled, ten-seeded, with a dark purple juice.	Phytolacca.
Four-celled, four-seeded, with a convex inferior disk.	Rhamnus cathartica.
One-celled, one-seeded, bright red, woolly.	Rhus glabra.
black, globular, pericarp prolonged into a stalk.	Cubeba.

unstalked, the undeveloped embryo in a central cavity.	Piper nigrum.
whitish, globular, veined, not hollow.	Piper album.
III. Inferior drupaceous fruits.	
Globular, brown, two-celled, two-seeded.	Pimenta.
Oval-oblong, dark brown, two-celled, each cell with one or two seeds.	Caryophylli fructus.
IV. Superior drupes.	
Roundish-reniform, blackish, seed semilunar, bitter.	Cocculus.
Flattish-reniform, brown, nut-like, sarcocarp caustic.	Anacardium occidentale.
Flattish-ovate, blackish, nut-like, sarcocarp caustic.	Anacardium orientale.
Somewhat five-angled, orange- or blackish-brown, very astringent.	Myrobalanus.
Oblong, dark blue, glaucous, sweet.	Prunum.
Hemispherical, red, finely hairy, composed of many small drupes.	Rubus idæus.
V. Superior berries.	
Globular, acidulous, sweet, few-seeded.	Uva passa.
six-celled, six-seeded, very astringent.	Diospyros.
ten-celled, many-seeded, very aromatic.	Aurantium.
twelve-celled, many-seeded, pulp hard, mucilaginous.	Bela.
Oval, with a nipple-shaped apex; pulp very acid.	Limon.
Oblong, two-celled, many-seeded, burningly acrid.	Capsicum.
VI. Inferior berries.	
Pulp white, spongy, separable into three many-seeded cells.	Colocynth.
VII. Capsular fruits, superior.	
Cylindrical, with numerous transverse partitions containing a sweet pulp.	Cassia fistula.
Broadly linear; internally fleshy, sweet.	Ceratonia.
Subglobose; stigmas sessile, radiating; seeds numerous, parietal.	Papaver.
Small utricle; seed lenticular, black, glossy.	Chenopodium.
Capsules 3, two-valved; seeds 1 or 2, black.	Xanthoxylum.
Follicles 8, stellate, one-seeded, aromatic.	Illicium.

Description.—The petals are collected before the flowers are expanded. Small cones, consisting of numerous imbricated, roundish, retuse, deep purple-colored, yellow-clawed petals, having a roseate odor and a bitterish, slightly acidulous, and distinct astringent taste.

Constituents.—Volatile oil a trace, mucilage, sugar, quercitrin.

Properties.—Tonic, mild astringent. *Dose*, 1 to 4 grams (gr. xv–ʒj), in powder, confection, or infusion.

RHŒAS.—Red Poppy.

Origin.—Papaver Rhœas, *Linné.* *Natural order*, Papaveraceæ.

Habitat.—Asia and Europe, in fields.

Description.—Petals roundish, about 5 centimeters (2 inches) broad, somewhat shorter, below contracted into a short blackish claw, thin, brownish-purple (fresh scarlet-red); odor slight; taste mucilaginous and bitterish.

Constituents.—Rhœadine a trace, rhœadic and papaveric acids (red coloring matters), gum, etc.

Properties.—Demulcent, mildly anodyne, used chiefly for coloring mixtures.

MATRICARIA.—German Chamomile.

Origin.—Matricaria Chamomilla, *Linné.* *Natural order*, Compositæ, Senecionideæ.

Habitat.—Europe and Asia.

Description.—About 12 millimeters (½ inch) broad, composed of a flattish imbricated involucre, a conical hollow naked receptacle, about 15 white ligulate, three-

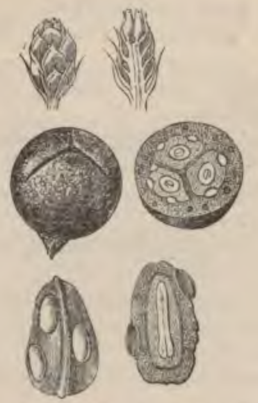
JUNIPERUS.—JUNIPER.

Origin.—Juniperus communis, *Linné. Natural order*, Coniferæ, Cupresseæ.

Habitat.—Northern hemisphere.

Description.—Nearly globular, about 8 millimeters ($\frac{1}{3}$ inch) in diameter; dark purplish, with a bluish-gray bloom, at the apex with a three-rayed furrow; internally pulpy, greenish-brown, with oil cells and containing three ovate somewhat triangular bony seeds with several large oil glands on the surface; odor aromatic; taste sweet, balsamic, bitterish, and slightly acrid.

Fig. 176.

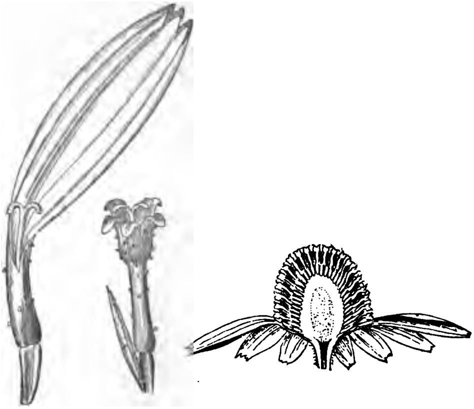


Juniperus.—Fertile catkin and longitudinal section. Galbulus, and transverse section. Seed, and longitudinal section.

The pulpy portion is produced from the coalesced three scales forming the upper whorl of the pistillate catkin. The galbulus ripens in the second year.

Description.—Collected from cultivated plants. Subglobular, about 2 centimeters ($\frac{4}{5}$ inch) broad, consisting of an imbricated involucre, numerous white, pistillate, strap-shaped, three-toothed florets, and a few yellow, tubular disk florets inserted upon a chaffy, conical, solid receptacle; odor strong and pleasant; taste aromatic, bitter.

Fig. 173.



Anthemis nobilis.—Ray and disk floret, magnified 4 diam. Section through single flower-head.

Constituents.—Volatile oil (blue, green, or yellow, spec. grav. 0.90, soluble in alcohol, contains isobutylic and isamylic ethers), bitter principle (anthemic acid?), resin, little tannin, etc.

Properties.—Stimulant, tonic, carminative, nervine, emmenagogue. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion or fluid extract.

millimeters (1 inch) long, dark purple, fleshy and juicy, each fruit crowned with two filiform styles; juice deep purplish-red, sweet and acidulous.

Morus nigra, *Linné*, has a shorter ovate or oblong fruit, resembling the preceding. The fruit of Morus alba, *Linné*, is white, reddish, or blackish, sweet, scarcely acidulous.

Constituents.—Sugar, pectin, citrates, malates, etc.

Properties.—Refrigerant; used for flavoring mixtures.

HUMULUS.—Hops.

Origin.—Humulus Lupulus, *Linné*. *Natural order*, Urticaceæ, Cannabineæ.

Habitat.—Northern temperate zone; cultivated.

Description.—Ovate, about 3 centimeters (1¼ inch) long, consisting of a thin, hairy, undulated axis, and many obliquely ovate membranous greenish scales, which are in the upper part reticulately veined, and towards the base parallel-veined, glandular, and surrounding a subglobular akene; odor aromatic; taste bitter, aromatic, and slightly astringent.

Constituents.—Volatile oil 0.8 per cent., resin 9–18, tannin 3–4, ash 7–10 per cent. The aromatic and bitter virtues reside in the glands. (See Lupulinum.)

Properties.—Tonic, sedative, anodyne. *Dose*, 2 to 20 grams (ʒss–v), in infusion or tincture; externally as fomentation and poultice.

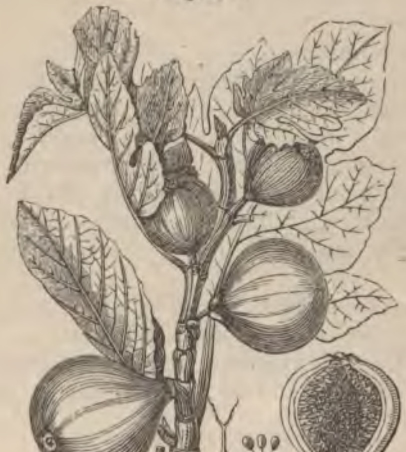
FICUS.—Fig.

Origin.—Ficus Carica, *Linné*. *Natural order*, Urticaceæ, Artocarpeæ.

Habitat.—Western Asia; cultivated in subtropical countries.

Description.—Compressed, of irregular shape, fleshy, covered with an efflorescence of sugar, of a sweet fruity odor and very sweet mucilaginous taste. When softened in water, figs are pear-shaped, with a scar or short stalk at base, and a small scaly orifice at apex; hollow internally, the inner surface covered with numerous yellowish,

Fig. 177.



Ficus Carica, *Linné*.—*a*. Section of fig. *b*. Staminate, *c*. Pistillate flowers.

hard akenes. They consist of the fleshy receptacle, which in the unripe state contains an acrid milk-juice.

Constituents.—Akenes and cellular tissue 15, water 16, sugar 62 per cent., gum, fat, and salts.

Properties.—Demulcent, laxative; used internally as dietetic; externally as poultice.

ROSA CANINA.—Hips.

Cynosbata.

Origin.—Rosa canina, *Linné*. *Natural order*, Rosaceæ, Roseæ.

Habitat.—Europe.

Description.—Pitcher-shaped, about 2 centimeters (⅘ inch) long, bright red, glossy, fleshy, inner surface bristly, nearly inodorous, and of a sweetish, acidulous, somewhat astringent taste. Hips consist of the receptacle (or calyx-tube), are crowned with the five sepals or their remnants, and inclose a number of brown hairy akenes. For medicinal use the akenes and hairs are removed.

Constituents.—Malic acid 7–8, citric acid 2–3, sugar 30, gum 25 per cent., tannin a trace, etc.

Properties.—Refrigerant, mild astringent, diuretic; used as a dietetic and as an excipient in the form of confection.

PHYTOLACCÆ BACCA.—Pokeberry.

Origin.—Phytolacca decandra, *Linné*. *Natural order*, Phytolaccaceæ.

Habitat.—North America; naturalized in Europe.

Description.—Depressed globular, dark purple, compound berry about 8 millimeters (⅓ inch) in diameter, composed of 10 carpels, each containing one lenticular black seed; juice purplish-red; inodorous, sweet, slightly acrid.

Constituents—Sugar, gum, coloring matter, turned yellow by alkalies and bleached by sunlight.

Properties.—Alterative, laxative, emetic. *Dose*, 0.5 to 1 gram (gr. viij–xv), in infusion, or the expressed juice in dose of half to one teaspoonful.

RHAMNUS CATHARTICA.—BUCKTHORN.

Origin.—Rhamnus (Cervispina, *Moench*) cathartica, *Linné. Natural order*, Rhamnaceæ.

Habitat.—Europe and Northern Asia; naturalized in North America.

Description.—Globular, and, after drying, deeply wrinkled, about 5 millimeters (⅕ inch) in diameter, green-brown or black, at the base with a convex disk, fleshy, with a brownish-green juice; endocarp parchment-like, four-celled, and four-seeded; the seeds dark brown, tri-angular-convex, furrowed on the back; odor slight, unpleasant; taste disagreeable, bitter, and acrid.

Constituents.—Rhamnocathartin (amorphous, yellowish), rhamnin (yellowish granules, tasteless, olive-green by ferric salts), sugar, gum, tannin, etc.

Properties.—Cathartic; the expressed juice made into syrup in doses of 10 to 20 grams (f℥ij–iv). The juice treated with lime or alumina yields sap-green.

Allied drugs.—French berries from Rhamnus infectoria, *Linné*, and Persian berries from Rhamnus saxatilis, *Linné*, and other species of Rhamnus are collected unripe, resemble buckthorn berries, but are less wrinkled, internally yellowish, from two- to four-seeded, contain chrysorhamnin and rhamnoxanthin, and are employed for dyeing yellow.

RHUS GLABRA.—Sumach.

Origin.—Rhus glabra, *Linné.* *Natural order*, Anacardiaceæ.

Habitat.—North America, in barren soil.

Description.—Subglobular, about 3 millimeters ($\frac{1}{8}$ inch) in diameter, drupaceous, crimson, densely hairy, containing a roundish-oblong, smooth putamen; inodorous; taste acidulous.

Constituents.—Acid calcium and potassium malates, tannin, coloring matter, etc.

Properties.—Refrigerant, diuretic, astringent; used mostly as gargle in decoction or fluid extract.

CUBEBA.—Cubeb.

Origin.—Cubeba officinalis, *Miquel.* *Natural order*, Piperaceæ.

Habitat.—Java; cultivated.

Description.—Collected unripe. Globular, about 4 millimeters ($\frac{1}{6}$ inch) in diameter, contracted at the base into a stipe about 8 millimeters ($\frac{1}{3}$ inch) long, reticulately wrinkled, blackish-gray, the mesocarp with numerous oil cells; internally whitish and hollow, containing a partly developed depressed globular seed; odor strong spicy; taste pungently aromatic.

Cubeb should not be mixed with the nearly inodorous rachis or stalks.

Allied fruits.—Cubeba Lowong, *Miquel*, and C. Wallichii, *Miquel.* Closely resembling cubeb.

Cubeba canina, *Miquel.* The stipe is half the length of the globular portion.

Cubeba crassipes, *Miquel.* Fruit larger than cubeb; pedicel stout and flattish; odor agreeable; taste bitter.

Constituents.—Volatile oil 5 to 15 per cent., resin 3 per cent., cubebic acid 1 to 3 per cent., cubebin, fat, wax, etc. Oil of cubeb is colorless, of spec. grav. 0.92, not freely soluble in 80 per cent. alcohol, levogyre, not fulminating with iodine, of composition $C_{30}H_{48}$, colored red by warm H_2SO_4. Cubeb resin is amorphous, not precipitated by alcoholic solution of lead acetate. Cubebic acid is more readily soluble in simple solvents, is precipitated by lead acetate, amorphous, some of its salts crystalline. Cubebin is white, pearly, crystalline, tasteless. The three last mentioned compounds are colored red by sulphuric acid.

Properties.—Stimulant, local irritant, carminative (volatile oil), diuretic (resin and cubebic acid). *Dose,* 1 to 8 grams (gr. xv–ʒij), in powder, fluid extract, or oleoresin.

PIPER.—BLACK PEPPER.

Origin.—Piper nigrum, *Linné.* *Natural order,* Piperaceæ.

Habitat.—India; cultivated in the tropics.

Description.—Collected unripe. Globular, about 4 millimeters ($\frac{1}{6}$ inch) in diameter, reticulately wrinkled, brownish-black or grayish-black, the mesocarp with scattered oil cells; internally lighter, hollow, with an undeveloped embryo; aromatic and of a spicy hot taste.

Constituents.—Volatile oil 1 to 2 per cent., piperine, $C_{17}H_{19}NO_3$, pungent resin (soluble in alkalies, alcohol, and ether), fat, ash 5 per cent. Volatile oil of pepper is colorless, not pungent, of composition $C_{10}H_{16}$. Commercial oil of black pepper (so called) contains the pungent resin and fat, and is obtained as a by-product in the preparation of piperine. The latter is in colorless or yellowish prisms, inodorous, of a slowly developed peppery taste, colored blood-red by H_2SO_4, and by alcoholic solution of alkalies decomposed into piperic acid, $C_{12}H_{10}O_4$, and piperidine, $C_5H_{11}N$, of an ammoniacal and peppery odor.

Properties.—Stimulant, irritant, tonic, febrifuge. *Dose*, 0.3 to 1.5 gram (gr. v–xxij), in powder, confection, or oleoresin.

PIPER ALBUM.—WHITE PEPPER.

Origin.—Piper nigrum, *Linné* (see above); the ripe fruit deprived of epicarp and mesocarp.

Description.—Globular, smooth, with ten or twelve veins from base to apex, whitish, and, after the removal of the endocarp, reddish-brown; under the testa an albuminous seed; odor and taste pepper-like, less pungent.

Constituents and Properties.—Same as black pepper.

PIMENTA.—PIMENTO.

Semen amomi.—Allspice.

Origin.—Eugenia Pimenta, *De Candolle. Natural order*, Myrtaceæ.

Habitat.—Tropical America; cultivated.

Description.—Nearly globular, about 6 millimeters (¼ inch) in diameter, crowned with the short four-parted calyx limb or its remnants and a short style, brownish or brown-gray, granular and glandular, two-celled, each cell with one brown, plano-convex, roundish-reniform seed; pungently aromatic, clove-like.

Constituents.—Volatile oil 3 to 4 per cent., resin, fat, tannin, sugar, gum, etc. Oil of pimento has the spec. grav. 1.0374, and contains a hydrocarbon and eugenol.

Properties.—Stomachic, stimulant, carminative. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder.

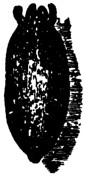
CARYOPHYLLI FRUCTUS.—MOTHER-CLOVE. ANTHOPHYLLI.

Origin.—Eugenia caryophyllata, *Thunberg*, s. Caryophyllus aromaticus, *Linné*. *Natural order*, Myrtaceæ.

Habitat.—Molucca Islands; cultivated in the tropics.

Description.—Collected while unripe; oval-oblong, about 20 millimeters (⅘ inch) long, crowned with four calyx teeth, dark brown, two-celled, each cell with one or two seeds; odor and taste clove-like, mild.

Fig. 178.



Caryophylli fructus.

Constituents and Properties.—Similar to cloves.

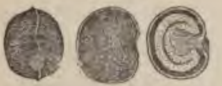
COCCULUS.—COCCULUS INDICUS. FISHBERRY.

Origin.—Anamirta Cocculus, *Wight et Arnott*, s. An. paniculata, *Colebrook*. *Natural order*, Menispermaceæ.

Habitat.—East India.

Description.—Globular kidney-shaped, about 10 millimeters ($\frac{2}{5}$ inch) long and 6 millimeters ($\frac{1}{4}$ inch) thick, blackish-brown, wrinkled, the basal and apical scars close together and united by an obscure ridge around the convex side; endocarp whitish, thin, on the concave side projecting deeply into the interior; seed semilunar, oily, very bitter.

Fig. 179.



Cocculus,—Fruit and longitudinal section.

Constituents. — The pericarp contains menispermine (soluble in ether) and paramenispermine, two tasteless alkaloids, hypopicrotoxic acid, resin, fat, gum, etc. The seed contains picrotoxin, $C_9H_{10}O_4$, bitter, poisonous, by fractional crystallization from benzol and water separated into picrotoxinin, $C_{15}H_{16}O_6$ (32 per cent., poisonous), and picrotin, $C_{25}H_{30}O_{12}$ (66 per cent., not poisonous), and anamirtin or cocculin, $C_{19}H_{24}O_{10}$ (2 per cent., not bitter or poisonous).

Properties.—Nervine, sedative. *Dose*, 0.1 to 0.2 gram (gr. jss–iij), in powder, of picrotoxin 0.001 gram ($\frac{1}{64}$ grain); externally in decoction for killing vermin.

ANACARDIUM.—CASHEW NUT.

Origin.—Anacardium occidentale, *Linné.* *Natural order*, Anacardiaceæ.

Habitat.—Tropical America; naturalized in Africa and India.

Description.—Kidney-shaped, about 25 millimeters (1 inch) long, 18 millimeters ($\frac{3}{4}$ inch) broad, and 10 millimeters ($\frac{2}{5}$ inch) thick, gray-brown; between the brittle epicarp and endocarp a soft sarcocarp containing a black acrid juice; seed large white, of a mild oily taste.

Constituents.—In the pericarp cardol, $C_{21}H_{30}O$ (oily, very acrid), anacardic acid (hot taste, not vesicating), resin, tannin, gum, etc.; in the seed a bland fixed oil.

Properties and Uses.—The pericarp as a rubefacient, epispastic, and caustic; the seed is edible, likewise the fleshy and acidulous pedicel.

SEMECARPUS.—ANACARDIUM ORIENTALE. ORIENTAL CASHEW NUT.

Origin.—Semecarpus Anacardium, *Linné filius. Natural order*, Anacardiaceæ.

Habitat.—East India.

Description.—Ovate heart-shaped, flattish, about 20 millimeters (4/5 inch) long, blackish-brown, in the pericarp with a brown acrid juice; seed white, mild, oily.

Constituents and Properties.—Like the preceding.

MYROBALANUS.—MYROBALAN.

Origin.—Terminalia Chebula, *Retzius;* T. bellerica, *Roxburgh;* T. citrina, *Roxburgh*, etc. *Natural order*, Combretaceæ.

Habitat.—Southern Asia.

Description.—Oblong, roundish-oval or pyriform, 3 to 5 centimeters (1 to 2 inches) long, more or less distinctly five-angled and five-ribbed, brown or orange-colored; sarcocarp of a somewhat resinous fracture; endocarp hard, resinous-dotted, containing a white oily seed; inodorous, strongly astringent.

Constituents.—Gallotannic acid about 45 per cent., gallic acid, resin, mucilage.

Properties.—Astringent; used for tanning purposes and for preparing tannin.

PRUNUM.—Prune.

Origin.—Prunus domestica, *Linné.* *Natural order*, Rosaceæ, Amygdaleæ.

Habitat.—Western Asia; cultivated in many varieties.

Description. — Oblong or subglobular, shrivelled, blackish-blue, glaucous, the sarcocarp brownish-yellow, sweet and acidulous; putamen hard, smooth or irregularly ridged; the seed almond-like, but smaller, and of a bitter taste. For medicinal use the putamen and seed are rejected.

Constituents.—In the sarcocarp sugar 12 to 25 per cent., pectin, malic acid, salts; in the seed fixed oil, amygdalin, emulsin.

Properties.—The sarcocarp is nutritious and laxative; used as a corrective for senna in decoction and confection.

RUBUS IDÆUS.—Raspberry.

Origin.—Rubus Idæus, *Linné.* *Natural order*, Rosaceæ, Dryadeæ.

Habitat.—Europe and Asia; cultivated.

Description.—Hemispherical, about 1 centimeter ($\frac{2}{5}$ inch) broad, with a conical cavity from the separation of the receptacle; red, finely hairy, composed of about 25 small drupes, which are coalesced at the base and crowned with the remnant of the style; juicy, of an agreeable odor, and a pleasant acidulous taste. The fruit is used in the fresh state only.

Rubus strigosus, *Michaux*, indigenous to North America, closely resembles the preceding; the color of the fruit is a lighter red.

Rubus occidentalis, *Linné*, indigenous to North America, has a purplish-black fruit.

The blackberries, Rubus villosus, *Aiton*, etc., have the fruit united with the receptacle.

Constituents.—Volatile oil a trace, citric and malic acids, pectin, glucose, coloring matter.

Properties.—Refrigerant, mild laxative, dietetic.

UVA PASSA.—Raisin.

Origin.—Vitis vinifera, *Linné*. *Natural order*, Vitaceæ.

Habitat.—Western Asia; extensively cultivated in Southern Europe.

Description.—Shrivelled and flattened, in the fresh state globular, one-celled berries, brownish, somewhat translucent, sweet, and acidulous.

Raisins should be freed from the stalks and seeds.

Varieties.—Large raisins, Passulæ majores, produced in Spain, Italy, and Asia Minor; the Sultana raisins are seedless.

Small raisins, Passulæ minores or Corinthian raisins (often called currants), are chiefly exported from Greece.

Constituents.—In the epicarp tannin and coloring matter; in the pulp grape sugar, acid potassium tartrate, calcium tartrate, little malic acid, mucilage, etc.

Properties.—Nutritive, demulcent, refrigerant, aperient; used as a corrective and flavor of mucilaginous and bitter drinks, etc.

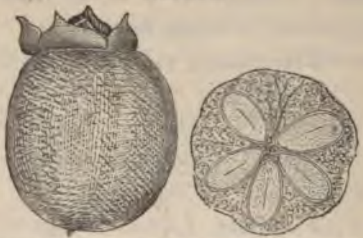
DIOSPYROS.—Persimmon.

Origin.—Diospyros virginiana, *Linné*. *Natural order*, Ebenaceæ.

Habitat.—United States, in low grounds and woods.

Description.—Globular or globular-oblong, about 25 millimeters (1 inch) long, green, smooth, at the base with the four-lobed calyx, at the apex with a short remnant of the style, six-celled and six-seeded; odor slight, fruit-like; taste very astringent. After exposure to frost the taste is acidulous and sweet.

Fig. 180.



Diospyros.—Fruit and transverse section, natural size.

Constituents.—Tannin, malic acid, pectin.

Properties.—Astringent. *Dose*, 1 to 4 grams (gr. xv–ʒj), in infusion or tincture.

AURANTII FRUCTUS.—BITTER ORANGE.

Origin.—Citrus vulgaris, *Risso.* *Natural order*, Aurantiaceæ.

Habitat.—Northern India; cultivated and naturalized in subtropical countries.

Description.—1. Orange berries, Aurantia immatura; the unripe fruit; globular or subglobular, 3 to 20 millimeters ($\frac{1}{8}$ to $\frac{4}{5}$ inch) in diameter, black-green or brownish, rugose, at the base with about ten round depressions forming a circular scar; at the apex with a short remnant of the style; hard, containing 8 to 12 cells, each with several undeveloped seeds; agreeably aromatic, very bitter.

2. Bitter orange, Aurantii fructus; the ripe fruit; of the size and shape of a sweet orange, but externally rougher, orange-red, the juice acidulous and bitter.

Constituents.—Volatile oil, hesperidin (bitter, crystalline, glucoside, yellow by alkalies), resin, fat, gum, etc.; in the juice citric acid. The volatile oil of orange berries was formerly sold as essence de petit grain (now often made of the leaves), and is mainly hesperidene, $C_{10}H_{16}$, like the oil of bitter orange, which is obtained by grating the epicarp.

Properties.—Stimulant, stomachic, tonic. *Dose*, 1 to 2 grams (gr. xv–xxx), in tincture or wine. The juice of the ripe fruit is also refrigerant.

BELA.—BAEL. BENGAL QUINCE.

Origin.—Aegle (Cratæva, *Linné*) Marmelos, *Correa. Natural order*, Aurantiaceæ.

Habitat.—Himalaya Mountains; cultivated in India.

Description.—Collected while unripe. Globular or subglobose, 5 to 10 centimeters (2 to 4 inches) in diameter, twelve-celled; in commerce often in fragments, consisting of a brownish-gray, smooth, hard rind, 2 or 3 millimeters ($\frac{1}{12}$ to $\frac{1}{8}$ inch) thick, to which a hard mucilaginous, somewhat acidulous, red-brown and internally whitish pulp is adhering, inclosing oblong flat woolly seeds; inodorous, slightly astringent; the infusion scarcely affected by iron salts.

Constituents.—Mucilage, pectin, sugar, and little tannin, bitter principle, and volatile oil.

Properties.—Mild astringent. *Dose*, 1 to 3 grams (gr. xv–xlv), in infusion or fluid extract.

LIMON.—Lemon.

Origin.—Citrus Limonum, *Risso.* *Natural order*, Aurantiaceæ.

Habitat.—India; cultivated in subtropical countries.

Description.—Used in the fresh state. Oval or obovate, with a nipple-shaped apex, about 75 millimeters (3 inches) long, yellow, nearly smooth, but ruggedly glandular; internally divided into from 8 to 12 cells, each with 2 or 3 seeds and containing an acid juice; the rind fragrant and somewhat bitter (see Limonis cortex).

Constituents.—Yield of juice 20 to 30 grams (ʒv–vijss); spec. grav. about 1.04; yellowish; contains 7 to 9 per cent. of citric acid, a little malic acid, and mucilage, and yields not over ½ per cent. of ash. On keeping lemons for several months, the citric acid is decomposed into sugar and carbonic acid.

Properties. — Refrigerant. *Dose*, 8 to 20 grams (ʒij–v), diluted with water and as syrup.

CAPSICUM.—Cayenne Pepper, Bird Pepper.

Origin. — Capsicum fastigiatum, *Blume.* *Natural order*, Solanaceæ.

Habitat.—Probably tropical America; cultivated.

Description.—Conical, from 12 to 18 millimeters (½ to ¾ inch) long, supported by a flattish, cup-shaped, five-toothed calyx, with a red, shining, membranous, and translucent pericarp, inclosing two cells, and containing flat, reniform, yellowish seeds attached to a thick central placenta. It has a peculiar odor and an intensely hot taste.

The fruit of Capsicum annuum, *Linné*, is larger, 5 to 8 centimeters (2 to 3¼ inches) long, conical, sometimes curved or subglobular; the fruit of C. cerasiforme, *Willdenow*, is of the size and shape of a cherry.

Constituents.—Capsaicin, $C_9H_{14}O_2$, fixed oil, trace of volatile oil, waxy matter, resin, coloring matter, trace of volatile alkaloid having the odor of coniine. Capsaicin is crystalline, colorless, fusible, volatile, extremely acrid, soluble in alcohol, ether, benzol, and fixed oils.

Properties.—Stimulant, stomachic, powerful rubefacient. *Dose*, 0.1 to 0.5 gram (gr. jss–viij), in powder, infusion, tincture, or oleoresin; externally in liniments and plasters.

COLOCYNTHIS.—Colocynth.

Origin.—Citrullus (Cucumis, *Linné*) Colocynthis, *Schrader*. *Natural order*, Cucurbitaceæ.

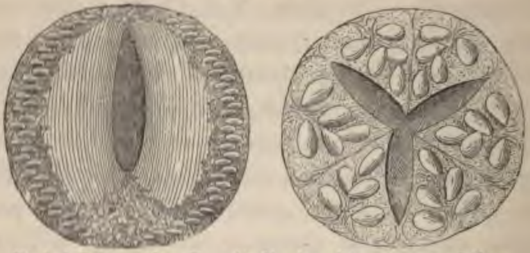
Habitat.—Southern and Western Asia and Northern Africa.

Description.—Deprived of the smooth, light brownish-yellow rind. Globular, 5 to 10 centimeters (2 to 4 inches) in diameter, white or yellowish-white, light, spongy, readily breaking into three wedge-shaped pieces, each containing near the rounded surface many flat, ovate, brown seeds; inodorous; taste intensely bitter.

The pulp alone (about 30 per cent. of the peeled fruit), deprived of the seeds, should be employed. Hard and dark colored colocynth should be rejected.

Constituents.—Colocynthin, resin, colocynthitin (tasteless crystalline resin), pectin, gum, 11 per cent. ash. Colocynthin is yellow, amorphous, or crystalline, soluble in water and alcohol, very bitter, and splits into sugar and resinous colocynthein. The seeds contain little bitter principle, 17 per cent. of fixed oil, and 2.5 to 3 per cent. of ash.

Fig. 181.



Peeled Colocynth.—Longitudinal and transverse section.

Properties.—Drastic purgative, in overdoses emetic and irritant. *Dose*, 0.1 to 0.5 gram (gr. jss–viij), in powder, tincture, or extract.

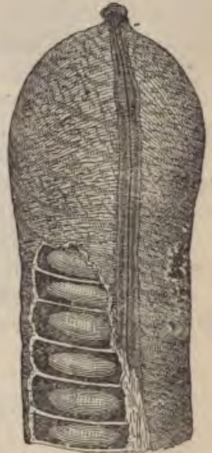
CASSIA FISTULA.—Purging Cassia.

Origin.—Cassia (Cathartocarpus, *Persoon*) Fistula, *Linné*. *Natural order*, Leguminosæ, Cæsalpinieæ.

Habitat.—East India; naturalized in tropical Africa and America.

Description.—Cylindrical, 43 to 60 centimeters (18 to 24 inches) long, nearly 25 millimeters (1 inch) in diameter; pericarp blackish-brown, woody, somewhat veined, the sutures smooth, forming two longitudinal bands, the ventral band with a shallow groove, and the dorsal one with a fine ridge; indehiscent; internally divided transversely into numerous cells, each containing an ovate, flattish-glossy seed imbedded in a blackish-brown sweet pulp; odor resembling prunes.

Fig. 182.



Cassia Fistula.—Part of pod, natural size.

Other Varieties.—Cassia moschata, *Kunth*, of New Granada, perhaps also C. baccilaris, *Linné filius*, of Surinam. 30 to 50 centimeters (12 to 20 inches) long, about 12 millimeters ($\frac{1}{2}$ inch) thick; often curved; the pericarp and pulp of a lighter color than in Cassia Fistula.

Cassia brasiliana, *Lamarck*, s. C. grandis, *Linné filius*, of Brazil. 60 centimeters (24 inches) or more long, laterally compressed, about 38 millimeters ($1\frac{1}{2}$ inch) broad, black-brown, coarsely veined, the sutures prominent.

Constituents.—The pulp (yield about 30 per cent.) contains sugar 60 per cent., mucilage, pectin, albuminoids, salts (calcium oxalate).

Properties.—Laxative. *Dose*, 4 to 10 grams (ʒj–ijss); used for confection of senna.

CERATONIA.—St. John's Bread.

Siliqua dulcis.

Origin.—Ceratonia Siliqua, *Linné.* *Natural order,* Leguminosæ, Cæsalpinieæ.

Habitat.—Southern Europe.

Description.—Broadly linear, about 15 centimeters (6 inches) long, 2 centimeters ($\frac{4}{5}$ inch) broad, and 3 millimeters ($\frac{1}{8}$ inch) thick, flat, thickened on the edges; epicarp leathery, brown, glossy; sarcocarp red-brown, pulpy; internally divided transversely into from 6 to 12 cells, each containing an ovate, flattish, glossy seed.

Constituents.—Sugar 40 to 50 per cent., mucilage, pectin, albuminoids, butyric acid, little tannin.

Properties.—Demulcent, laxative; used as an addition to expectorant mixtures.

PAPAVER.—Poppy.

Origin.—Papaver somniferum, *Linné.* *Natural order,* Papaveraceæ.

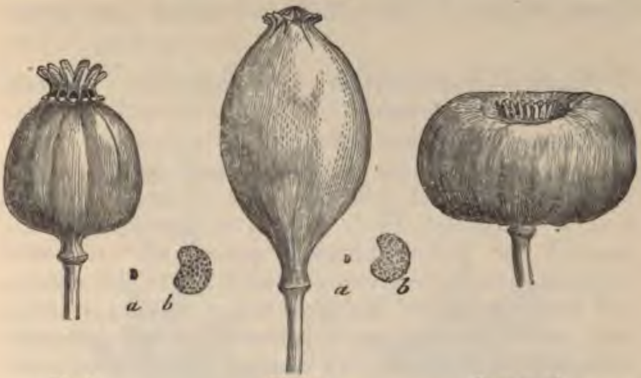
Habitat.—Western Asia; cultivated.

Description.—The capsules are collected when nearly ripe and freed from the seeds. Globular-ovate or ovate-oblong, crowned with the sessile, peltate, many rayed stigma, one-celled, but on the inner surface furnished with numerous vertical projecting placentas; of a slight odor and bitter taste.

Constituents.—Alkaloids in variable proportion, from traces to 0.10, occasionally as much as 2 per cent., consisting of morphine, narcotine, rhœadine, narceine, codeine, and papaverosine; little meconic acid; citric and tartaric acids, mucilage, wax, ash about 14 per cent.

Properties.—Anodyne, hypnotic, sedative. *Dose,* 1 to 2 grams (gr. xv–xxx), in decoction, syrup, and extract; externally as poultice.

Fig. 183.



Black. White. Depressed.

Poppy capsules and seeds (*a*, natural size; *b*, magnified).

CHENOPODIUM.—WORMSEED.

Origin.—Chenopodium ambrosioides, *Linné*, var. anthelminticum, *Gray*. *Natural order*, Chenopodiaceæ.

Habitat.—West Indies and Central America; naturalized in the United States.

Description.—Nearly 2 millimeters ($\frac{1}{12}$ inch) in diameter, depressed globular, glandular, dull greenish or brownish, the integuments friable, containing a lenticular, obtusely-edged, glossy, black seed, with a strongly curved embryo; odor peculiar, somewhat terebinthinate; taste bitterish pungent.

Constituents.—Volatile oil, spec. grav. 0.91, consists of $C_{10}H_{16}$ and $C_{10}H_{16}O$.

Properties.—Anthelmintic. *Dose*, 1 to 3 grams (gr. xv–xlv), in powder or electuary; the volatile oil 5 to 10 or 15 drops.

XANTHOXYLI FRUCTUS.—PRICKLY ASH FRUIT.

Origin.—Xanthoxylum carolinianum, *Lambert.* *Natural order*, Rutaceæ.

Habitat.—Southern United States.

Description.—Three or two carpels sessile on the thin receptacle; carpels somewhat obliquely globular, 5 or 6 millimeters ($\frac{1}{5}$ or $\frac{1}{6}$ inch) in diameter; brown-greenish or yellowish-brown, pitted and somewhat wrinkled, firm, two-valved, dehiscent by the inner suture and the upper half of the outer suture, valves spreading; each carpel contains one subglobular, or two somewhat flattened, black, glossy, and more or less wrinkled seeds, with a crustaceous testa inclosing a white fleshy albumen and embryo; odor somewhat aromatic; taste pleasantly pungent.

The fruit of Xanthoxylum fraxineum, *Willdenow*, resembles the preceding, but consists of 3 to 5 short-stalked capsules.

Constituents.—Resin, little volatile oil.

Properties.—Stimulant, tonic. *Dose*, 1 to 2 grams (gr. xv–xxx).

ILLICIUM.—STARANISE.

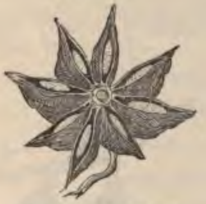
Origin.—Illicium anisatum, *Loureiro.* *Natural order*, Magnoliaceæ.

Habitat.—Southwestern China, Siam.

Description.—Eight follicles, stellately arranged around a central column about 5 millimeters ($\frac{1}{5}$ inch) long; carpels 12 to 15 millimeters ($\frac{1}{2}$ to $\frac{3}{5}$ inch) long, boat-shaped, somewhat woody, wrinkled, with a straight beak, brown, split along the upper suture; internally red-brown and glossy, containing a flattish, oval, glossy, brown seed; odor anise-like; taste sweet, aromatic; the seeds oily. 100 parts of fruit yield 78 parts of capsules and 22 parts of seed.

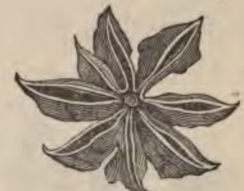
Adulteration.—Illicium religiosum, *Siebold*, indigenous to China and Corea, cultivated in Japan. Shikimi fruit. Poisonous. The fruit resembles the preceding, but the carpels are more woody, shrivelled and wrinkled, and have a thin beak, mostly turned upwards, a faintly aromatic, somewhat clove-like odor, and a disagreeable taste.

Fig. 184.



Illicium anisatum.

Fig. 185.



Illicium religiosum.

Constituents.—Volatile oil (from the capsules 5.3 per cent., from the seeds 1.8 per cent.), fat (from the capsules 2.8 per cent., from the seeds 20 per cent.), resin, etc. The volatile oil is chemically identical with the oil of Pimpinella Anisum, but has a slightly different odor and taste.

Shikimi fruit contains 0.44 per cent. of non-solidifying volatile oil, spec. grav. 1.006, and sikimin, the poisonous crystalline principle, soluble in alcohol, glacial acetic acid, ether, chloroform, and water.

Properties.—Carminative, anodyne, stimulant, diuretic. *Dose*, 0.5 to 1.5 gram (gr. viij–xxiij); mostly used for flavoring.

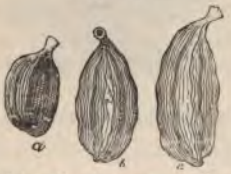
CARDAMOMUM.—CARDAMOM.

Origin.—Elettaria (Alpinia, *Roxburgh*, Amomum, *White*) Cardamomum, *Maton*. *Natural order*, Zingiberaceæ.

Habitat.—Malabar; cultivated in other parts of India.

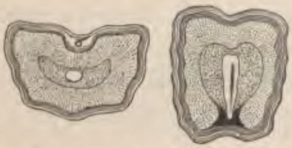
Description.—Ovoid or oblong, from 1 to 2 centimeters ($\frac{2}{5}$ to $\frac{4}{5}$ inch) long, obtusely triangular, rounded at the base, short-beaked, longitudinally striate, of a pale buff color, three-celled, with a thin, leathery, nearly tasteless pericarp and a central placenta; seeds about 20, reddish-brown, angular, transversely rugose, depressed at the hilum, surrounded by a thin membranous arillus, of an agreeable odor, and a pungent aromatic taste; the in-

Fig. 186.



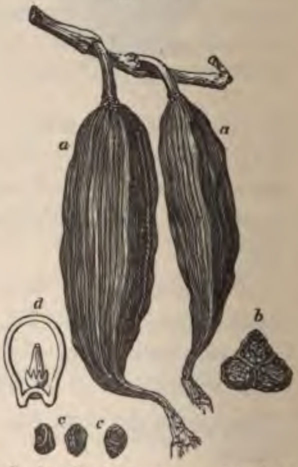
Malabar Cardamom.—*a*, short; *b*, medium; *c*, long.

Fig. 188.



Cardamom seed.—Transverse and longitudinal section, magnified 5 diam.

Fig. 187.



Ceylon Cardamom.—*a*, capsules; *b*, transverse section of capsule; *c*, seeds; *d*, section of seed with embryo, magnified.

teguments nearly tasteless. 100 parts of fruit yield 22 parts of capsules and 78 parts of seeds.

Varieties.—Malabar Cardamom, the most esteemed, of a light buff color, plump.

Aleppy Cardamom, mostly short, of a greenish tint.

Madras Cardamom, of a pale color, oblong, somewhat attenuated above.

The following varieties are of a somewhat different and inferior flavor:

Ceylon Cardamom, from Elettaria major, *Smith*, s. E. Cardamomum, var. β. About 38 millimeters (1½ inch) long, triangular, prolonged into a beak about 15 millimeters (⅗ inch) long, dark gray-brown.

Round Cardamom, globular or globular-ovate, from Amomum Cardamomum, *Linné*, of Siam and Java, and Am. globosum, *Loureiro*, of China.

Bengal Cardamom, from Amomum aromaticum, *Roxburgh*, near the apex with 9 wings.

Winged Java Cardamom, from Am. maximum, *Roxburgh*, with from 9 to 12 wings from base to apex.

Constituents.—Volatile oil 4 to 5 per cent., fixed oil 10 to 11 per cent., starch in minute granules, albuminoids, mucilage, ash about 15 per cent., containing 0.8 per cent. of manganese.

Properties.—Carminative, stomachic, stimulant. *Dose*, 0.3 to 1 gram (gr. v–xv), in powder, infusion, or tincture.

VANILLA.—VANILLA.

Origin.—Vanilla planifolia, *Andrews*. *Natural order*, Orchidaceæ.

Habitat.—Eastern Mexico, in hot damp woods; cultivated in the tropics.

Description.—Collected before ripe; the aroma developed by sweating. Linear, obscurely triangular from 15 to 25 centimeters (6 to 10 inches) long, narrowed and bent or hooked at the base, rather oblique at the apex, wrinkled, somewhat warty, dark brown, glossy, leathery, one-celled, containing a blackish-brown fragrant pulp with numerous minute seeds and more or less acicular crystals.

Varieties.—Mexican Vanilla, the finest quality.

Bourbon Vanilla, rather shorter and lighter than the preceding, the odor suggestive of tonka.

Venezuelan Vanilla, about 10 centimeters (4 inches) long, thick; resembling tonka in odor; probably from vanilla guianensis, *Splitberger*.

Brazilian Vanilla, vanillon, from Vanilla Pompona, *Schiede*, longer and thicker than the preceding; of an inferior vanilla odor.

Constituents.—Vanillin, $C_8H_8O_3$ (1.7 per cent. in Mexican, 2 per cent. in Bourbon, and 2.75 in Java vanilla, in the last two associated with odorous oil), fixed oil 11 per cent., resin, sugar, mucilage, etc. Vanillin is the aldehyd of methyl-protocatechuic acid, and is prepared artificially from coniferin (in the sap-wood of pines), carbolic acid, eugenol, and benzoin.

Properties.—Carminative, stimulant, aphrodisiac, antihysteric. *Dose*, 0.3 to 2 grams (gr. v–xxx), in powder, tincture, or syrup.

HORDEI FRUCTUS.—BARLEY.

Origin.—Hordeum distichum, *Linné*. *Natural order*, Graminaceæ.

Habitat.—Probably Western Asia; cultivated.

Description.—Elliptic, about 9 millimeters (⅜ inch) long, tapering toward both ends, and somewhat truncate, flattish upon the back, somewhat angled on the sides, with a groove along the front, smooth and grayish-yellow from the adherent paleæ, after their removal pale brownish; pericarp coalesced with the testa, and inclosing a layer of gluten, covering the central parenchyme filled with starch; taste farinaceous.

Maltum. Malt is barley germinated until the thin germ reaches nearly the length of the fruit, then dried; taste sweetish.

Constituents.—Barley; starch 60–68, proteids 12–16, fat 3, ash 3 per cent., little sugar.

Malt: diastase, dextrin, sugar, starch, etc.

Properties.—Nutritious.

LAPPÆ FRUCTUS.—BURDOCK FRUIT.

Origin.—Lappa officinalis, *Allioni. Natural order*, Compositæ, Cynareæ.

Habitat.—Asia and Europe; naturalized in North America.

Description.—Obovate-oblong, about 6 millimeters (¼ inch) long, somewhat curved and angled, roughish-wrinkled, brown-gray, the short stiff-hairy pappus wanting; inodorous, bitter.

The fruit of Silybum marianum, *Gœrtner*, or Mary-thistle of Southern Europe, is of similar appearance, obovate, about 5 millimeters (⅕ inch) long, flattish, smooth, mucilaginous, and somewhat bitter.

Constituents.—Bitter principle, fixed oil.

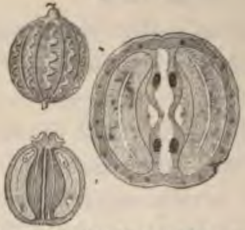
Properties.—Tonic, in psoriasis. *Dose*, 1 to 2 grams (gr. xv–xxx) in tincture.

CORIANDRUM.—Coriander.

Origin.—Coriandrum sativum, *Linné. Natural order*, Umbelliferæ, Cœlospermæ.

Habitat.—Central Asia aud Southern Europe; cultivated.

Fig. 189.



Coriandrum.—Fruit and longitudinal section, magnified 3 diam.; transverse section, magnified 8 diam.

Description.—Globular, about 3 millimeters (⅛ inch) in diameter, crowned with the calyx teeth, brownish-yellow, with slight longitudinal ridges; the two mericarps cohering, inclosing a lenticular cavity, and each furnished on the face with two oil-tubes; odor and taste agreeably aromatic.

Constituents.—Volatile oil ½ to 1 per cent., fat 13 per cent., mucilage, etc.

Properties.—Carminative, stimulant, stomachic. *Dose*, 0.5 to 2 grams (gr. viij–xxx).

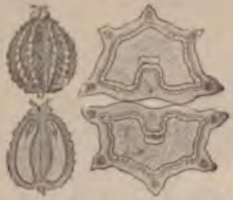
CONII FRUCTUS.—Conium Fruit, Hemlock Fruit.

Origin.—Conium maculatum, *Linné. Natural order*, Umbelliferæ, Campylospermæ.

Habitat.—Europe and Asia; naturalized in North America.

Description.—The fruit is gathered when full grown, while yet green. About 3 millimeters ($\frac{1}{8}$ inch) long, broadly ovate, laterally compressed, gray-green, smooth, often divided into the two mericarps, and these with five crenate ribs, without oil-tubes, and containing a seed which is grooved on the face; odor and taste slight; triturated with solution of potassa, a strong disagreeable odor is given off.

Fig. 190.



Conium.—Fruit and longitudinal section, magnified 3 diam.; transverse section, magnified 8 diam.

Constituents.—Conine, $C_8H_{17}N$, $\frac{1}{5}$–$\frac{1}{2}$ per cent., methylconine, $C_8H_{16}CH_3N$, conhydrine, $C_8H_{17}NO$, little volatile oil, fixed oil. Conine is colorless, oily, of spec. grav. 0.88, volatile, of a disagreeable odor and an acrid taste, soluble in alcohol, ether, and water, less in hot water. Methylconine resembles conine. Conhydrine is in iridescent scales, melts at 120° C. (248° F.), and is less poisonous than conine.

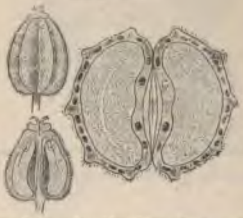
Properties.—Sedative, narcotic. *Dose,* 0.1 to 0.3 gram (gr. jss–v); of conine, 0.005 gram (gr. $\frac{1}{12}$).

ANISUM.—ANISE.

Origin.—Pimpinella Anisum, *Linné.* *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Western Asia, Egypt, Southeastern Europe; cultivated.

Fig. 191.



Anisum.—Fruit and longitudinal section, magnified 3 diam.; transverse section, magnified 8 diam.

Description.—Four or five millimeters ($\frac{1}{6}$–$\frac{1}{5}$ inch) long, ovate, compressed at the sides, grayish, finely hairy, and consisting of two mericarps, each with a flat face, five light brownish filiform ridges, and about fifteen or more thin oil-tubes; odor agreeable, aromatic; taste sweet, spicy.

The fruit of conium is usually in separate mericarps, smooth, grooved upon the face, and has no oil-tubes.

Constituents.—Volatile oil 1½–3 per cent., fixed oil 3–4 per cent., sugar, mucilage, etc. Oil of anise is colorless or yellowish, of spec. grav. 0.97, congeals at about 10° C. (50° F.), and consists chiefly of anethol, $C_{10}H_{12}O$.

Properties.—Carminative, stimulant, stomachic. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, spirit, volatile oil.

APIUM.—CELERY FRUIT.

Origin.—Apium graveolens, *Linné. Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Levant and Southern Europe; cultivated.

Description.—About 1 millimeter ($\frac{1}{25}$ inch) long, roundish-ovate, laterally compressed, brown, smooth, mostly divided into the two mericarps, and these with 5 filiform ribs, flat on the face, and containing about 12 oil-tubes; aromatic.

Constituents.—Volatile oil, spec. grav. 0.88, fixed oil, mucilage.

Properties.—Carminative, stimulant; used for flavoring.

PETROSELINUM.—PARSLEY FRUIT.

Origin.—Petroselinum sativum, *Hoffmann. Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Levant, Southern Europe; extensively cultivated.

Description.—About 2 millimeters ($\frac{1}{12}$ inch) long, ovate, laterally compressed, greenish- or brownish-gray, smooth, mostly divided into the two mericarps, and these with 5 filiform pale-colored ribs, flat on the face, and containing 6 oil-tubes; aromatic.

Constituents.—Volatile oil $1\frac{1}{2}$ to 3 per cent., fixed oil 12 per cent., resin 5 per cent., apiin, apiol, mucilage. The crude volatile oil contains much stearopten, volatilizing with difficulty. Apiol is colorless or yellowish, oily, and has the spec. grav. 1.075, a strong parsley odor, and a pungent taste; it is a mixture of several constituents.

Properties.—Carminative, stimulant, diuretic. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, infusion, or spirit. Apiol, 0.2 to 0.5 gram (gr. iij–viij), as a supposed febrifuge.

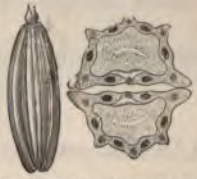
FŒNICULUM.—FENNEL.

Origin.—Fœniculum vulgare, *Gærtner*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Levant and Southern Europe; cultivated.

Description.—Oblong, nearly cylindrical, slightly curved, 4 to 6 millimeters (⅙ to ¼ inch) long, brownish or greenish-brown; readily separable into the two mericarps, and these with five light brown conspicuous obtuse ribs, 4 oil-tubes on the back and 2 or 4 oil-tubes upon the flat face; odor and taste aromatic, anise-like.

Fig. 192.



Fœniculum.—Fruit, 3 diam.; transverse section, 8 diam.

Varieties.—Saxon or German Fennel, described above.

Roman Fennel. Larger than the preceding, 8 to 10 millimeters (⅓ to ⅜ inch) long.

Bitter Fennel, collected in Southern France from wild growing plants; smaller, 3 to 5 millimeters (⅛ to ⅕ inch) long; taste bitterish and spicy.

Constituents.—Volatile oil 2 to 6 per cent., fixed oil 12 per cent., sugar, mucilage. Oil of fennel is colorless or yellowish, sweet, of spec. grav. 0.97, congeals below 10° C. (50° F.), and contains both solid and liquid anethol.

Properties.—Carminative, stimulant, stomachic, galactagogue. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, spirit, volatile oil.

PHELLANDRIUM.—WATER-DROPWORT.

Five-leaved water-hemlock.

Origin.—Œnanthe Phellandrium, *Lamarck*, s. Phellandrium aquaticum, *Linné*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Europe and Northern Asia.

Description.—Oblong or oblong-ovate, 3 or 4 millimeters (⅛ to ⅙ inch) long, nearly terete, brown or blackish-brown, smooth, each mericarp with five broad and obtuse ribs, four narrow grooves, and 6 oil-tubes; odor caraway-like, but unpleasant; taste aromatic bitter, somewhat acrid.

Constituents.—Volatile oil 1 to 1½ per cent., fixed oil, resin, mucilage.

Properties.—Carminative, stimulant, diaphoretic, diuretic. *Dose*, 1 to 2 or 4 grams (gr. xv–xxx–ʒj), in powder or infusion.

CUMINUM.—CUMIN FRUIT.

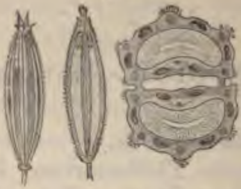
Origin.—Cuminum Cyminum, *Linné*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Northeastern Africa; cultivated.

Description.—Oblong, 5 or 6 millimeters (⅕ or ¼) long, narrowed at both ends, laterally compressed, brown, rough-hairy; each mericarp with 5 filiform yellowish ribs, 4 broader ones of a brown color, and 6 oil-tubes; odor and taste peculiar, somewhat like caraway.

Constituents.—Volatile oil 1 to 3 per cent., fixed oil, resin, mucilage. Oil of cumin is of spec. grav. 0.92, and consists chiefly of cymol or cymene, $C_{10}H_{14}$, and cuminol or cuminaldehyd, $C_{10}H_{12}O$.

Fig. 193.



Cumin.—Fruit and longitudinal section, 3 diam.; transverse section, 8 diam.

Properties.—Carminative, stimulant, antispasmodic. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder or volatile oil.

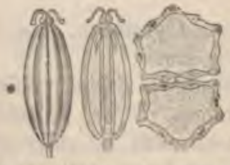
CARUM.—CARAWAY.

Origin.—Carum Carui, *Linné*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Central and Western Asia; cultivated.

Description.—Oblong, laterally compressed about 4 millimeters (⅙ inch) long, brown, smooth, usually separated into the two mericarps, and these curved, narrower at both ends, with five pale-colored filiform ribs, and

Fig. 194.



Carum.—Fruit and longitudinal section, 3 diam.; transverse section, 8 diam.

with 6 oil-tubes; odor aromatic, agreeable; taste sweetish, spicy.

Constituents.—Volatile oil 5 to 7 per cent., fixed oil, resin, sugar, mucilage, little tannin. Oil of caraway has the spec. grav. 0.92, and consists of carvene, $C_{10}H_{16}$, and carvol, $C_{10}H_{14}O$.

Properties.—Carminative, stimulant, diuretic. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, infusion, spirit, and volatile oil.

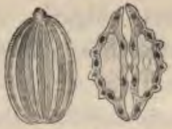
ANETHUM.—DILL.

Origin.—Anethum (Peucedanum, *Hiern*) graveolens, *Linné.* *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Levant and Southern Europe; cultivated.

Description.—Oblong or oval, about 4 millimeters (1/6 inch) long, dorsally compressed, brown, smooth, usually separated into the two thin mericarps, and these with six oil-tubes and with five ribs, of which three are filifom and the two lateral ones broadly winged and light-colored; odor and taste spicy, caraway-like.

Fig. 195.



Anethum.—Fruit, 3 diam.; transverse section, 5 diam.

Constituents.—Volatile oil 3 to 4 per cent., fixed oil, mucilage. Oil of dill has the spec. grav. 0.87, and consists chiefly of anethene, $C_{10}H_{16}$, of a lemon-like odor, and carvol.

Properties.—Carminative, stimulant, stomachic. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, infusion, or volatile oil.

CAROTA.—Carrot Fruit.

Origin.—Daucus Carota, *Linné*. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Northern Asia and Europe; naturalized in North America; cultivated.

Description.—About 4 millimeters ($\frac{1}{6}$ inch) long, oval, dorsally compressed, gray-brown, each mericarp with six thin oil-tubes and with nine ribs, of which five are hairy and four beset with long spiny bristles; odor slightly aromatic; taste pungent.

The fruit is collected from wild plants.

Constituents.—Trace of volatile oil, fixed oil.

Properties.—Stimulant, diuretic. *Dose*, 1 to 2 grams (gr. xv–xxx), in infusion.

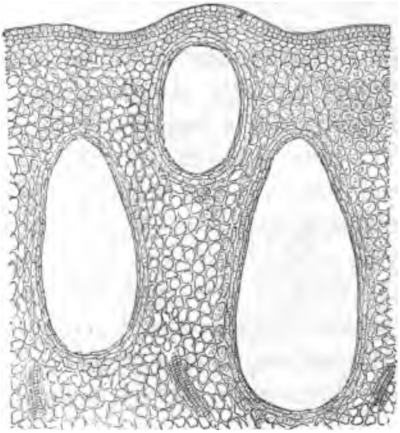
AURANTII CORTEX.—Orange Peel.

Origin.—1. Citrus vulgaris, *Risso*, bitter orange. 2. Citrus Aurantium, *Risso*, sweet orange. *Natural order*, Aurantiaceæ.

Habitat.—Northern India; cultivated in subtropical countries.

Description.—Narrow thin bands, the epidermis glandular and dark brownish-green (Aurantii amari cortex), or orange-yellow (Aurantii dulcis cortex), and with very little of the spongy white inner layer adhering to it; odor fragrant; taste aromatic and bitter, or, in the sweet orange peel, faintly bitter. In commerce frequently met with in curved elliptical sections, about 75 millimeters (3 inches) long, with a rather thick layer of the white zest. The epicarp consists under the epidermal layer, of parenchyme containing numerous large oil-cells and distant delicate vascular bundles.

Fig. 196.



Orange peel.—Transverse section, magnified 65 diam.

Constituents.—Volatile oil, hesperidin (see Aurantii fructus); in the white zest a principle giving a black color with ferric salts. Oil of bitter orange peel (essence de Bigarade) and oil of sweet orange peel (essence de Portugal) consist mainly of hesperidene, $C_{10}H_{16}$, with a small portion of an easily altered compound, $C_{10}H_{16}O$.

Properties.—Stimulant, tonic. *Dose*, 1 to 2 grams (gr. xv–xxx), in infusion or tincture. The volatile oil used for flavoring and in perfumes.

LIMONIS CORTEX.—LEMON PEEL.

Origin.—Citrus Limonum, *Risso.* *Natural order,* Aurantiaceæ.

Habitat.—Northern India; cultivated in subtropical countries.

Description.—Narrow thin bands, the epidermis deep lemon-yellow and ruggedly glandular, and with very little of the spongy white inner layer adhering to it; odor fragrant; taste aromatic bitterish. In commerce frequently met with in curved elliptical sections with a rather thick layer of white zest.

Constituents.—Volatile oil and hesperidin. Oil of lemon is pale yellow, of spec. grav. 0.85, and consists mainly of several hydrocarbons, $C_{10}H_{16}$, with a little cymene, $\text{Є}_{10}H_{14}$, and a compound ether.

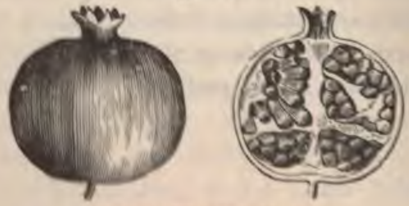
Properties.—Stimulant; used for its flavor.

GRANATI FRUCTUS CORTEX.—POMEGRANATE RIND.

Origin.—Punica Granatum, *Linné.* *Natural order,* Granataceæ.

Description.—In irregular curved brittle fragments, 1 or 2 millimeters ($\frac{1}{25}$ to $\frac{1}{12}$ inch) thick, some of them

Fig. 197.



Fruit of Punica Granatum.

with the tubular six- to nine-toothed calyx attached; externally roughish-tubercular and reddish-brown; inner surface lighter colored, marked with depressions; fracture granular; inodorous; taste astringent.

Constituents.—Tannin 28 per cent., gum, little sugar, ash 6 per cent.

Properties.—Astringent, anthelmintic. *Dose*, 1 to 3 grams (gr. xv–xxx), in powder or decoction.

TAMARINDUS.—TAMARIND.

Pulpa tamarindorum.

Origin.—Tamarindus indica, *Linné*, s. T. officinalis, *Hooker*. *Natural order*, Leguminosæ, Cæsalpinieæ.

Habitat.—India and tropical Africa; naturalized in the West Indies.

Description.—A reddish-brown sweet acidulous pulpy mass, containing strong somewhat branching fibres, and polished brown flattish subquadrangular seeds, each inclosed in a tough membrane.

Varieties.—West Indian tamarinds; described above; the inner part of the fruit is mixed with syrup.

East Indian tamarinds; preserved without syrup; tough, dark-colored masses, of a strong acid taste.

Egyptian tamarinds; preserved without sugar, formed into cakes, and dried; hard flattish acid cakes, frequently mouldy.

Constituents.—Tartaric, citric, a little malic, and acetic acids, mostly as potassium compounds; sugar, pectin, tannin, the latter in the testa of the seeds.

Properties.—Refrigerant, laxative. *Dose*, 2 to 20 grams (℥ss–v) or more, in infusion, whey, confection.

11. SEEDS.—SEMINA.

The seed is the fully developed ovule, and contains the embryo. It is invested with one or two integuments, the outer one being called testa or spermoderm, and the inner one tegmen or endopleura. In many seeds the tegmen is blended with the testa or coheres with the kernel. The seed-stalk, called funiculus or podosperm is usually absent in the officinal seeds; the scar left by its detachment is the hilum. The continuation of the funiculus along the testa is the raphe, and where it is confluent with the nucleus the chalaza or inner hilum is located. The micropyle, a small depression of the testa, marking the location of the radicle, is in nearly all officinal seeds near the hilum; most of the seeds are anatropous, and have the hilum and chalaza at nearly opposite ends and united by a raphe, while the campylotropous seeds, which are more or less kidney-shaped, have hilum, chalaza, and micropyle close together.

Within the seed-integuments is contained the embryo, consisting of a radicle, plumule, and one or two cotyledons, and either completely filling the seed-coats, in which case the seed is exalbuminous, or it is invested with another tissue, usually horny, oily, or amylaceous, which is called the albumen. The kernel of exalbuminous seeds consists chiefly of the cotyledons, the radicle and plumule being usually small; but albuminous seeds have frequently a small embryo, the greater portion of the seed-kernel consisting often of the albumen.

Classification.

Sect. 1. Dicotyledonous seeds.	
I. Exalbuminous.	
a. Embryo straight.	
Angular ovate; testa mucilaginous.	Cydonium.
Flattish ovate; testa membranous, brown, and scurfy; taste bland.	Amygdala dulcis.
taste bitter.	Amyg. amara.
testa coriaceous, white.	Melo.
Flat, ovate; testa white, grooved near the margin, edge obtuse.	Pepo.
testa white, ungrooved, edge thickish, acute.	Cucumis.
testa marbled or orange-brown, edge obtuse.	Citrullus.
Oblong; testa blackish, fragile; fragrant.	Dipterix.
Ovate-oblong; testa brown, fragile; cotyledons crumbling when cut.	Theobroma.
b. Embryo curved.	
Reniform-oblong, with a long furrow on the convex side.	Physostigma.
Rhomboid, with a diagonal furrow.	Fœnum græcum.
Subglobular; scarlet-red with a black spot.	Abrus.
Globular; testa yellowish, finely pitted.	Sinapis alba.
testa blackish-brown, finely reticulate.	Sinapis nigra.
testa blue-black, finely pitted, larger.	Rapa.
II. Albuminous.	
a. Embryo straight.	
Orbicular, horny.	Nux vomica.
Oblong, angular.	Ignatia.
Tetrahedral; testa black, pitted.	Delphinium.
testa gray-brown, pitted.	Staphisagria.
Triangular-ovate, black, fragrant when rubbed.	Nigella.
Flattish-ovate; testa brown, mucilaginous	Linum.
Globular-ovate; testa removed; albumen marbled.	Myristica.
Oval-oblong; testa glossy, grayish, variegated with red-brown.	Ricinus.

surface dull gray-brown mottled with black.	Tiglium.
testa dull black, with fine fissures.	Curcas.
b. Embryo curved.	
Elliptic plano-convex, grooved on the flat side.	Caffea.
Reniform; testa black, reticulate, and pitted.	Stramonium.
testa gray-brown, finely pitted.	Hyoscyamus.
testa blackish, bluish, or whitish, with shallow pits.	Papaver.
Sect. 2. Monocotyledonous seeds; all albuminous.	
Linear-oblong; blackish-brown.	Sabadilla.
Subspherical; testa granular; albumen horny.	Colchicum.
Roundish-angular, spicy; hilum depressed.	Granum paradisi.
hilum tufted.	Melegueta.
Roundish-conical, veined externally and internally.	Areca.

CYDONIUM.—QUINCE SEED.

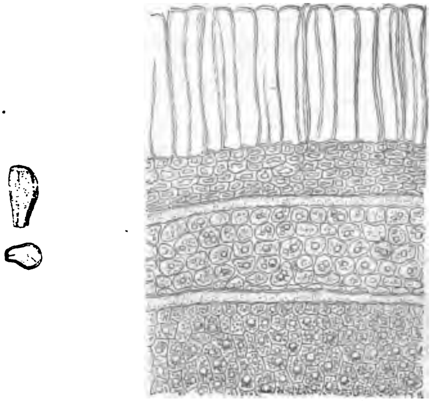
Origin.—Cydonia vulgaris, *Persoon.* *Natural order*, Rosaceæ, Pomeæ.

Habitat.—Western Asia; cultivated.

Description.—About 6 millimeters (¼ inch) long, ovate or ovate-oblong, triangularly compressed; hilum near the pointed end; testa brown, covered with a whitish mucilaginous epithelium, causing the seeds of each cell to adhere together, and, on immersion in water, forming a gelatinous zone; taste of the unbroken seed insipid; embryo white, oily, and of a bitter-almond taste; cotyledons thick, plano-convex.

Constituents.—Mucilage 20 per cent., not precipitated by borax.

Fig. 198.



Quince seed.—Natural size and section. Section through epithelium, testa, and tegmen, into a cotyledon; magnified 150 diam.

Properties.—The unbroken seeds are demulcent and protective. A thick mucilage is yielded from 1 part of seeds to 50 parts of water.

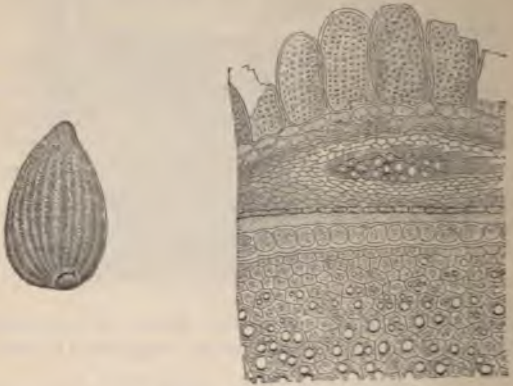
AMYGDALA.—Almond.

Origin.—Amygdalus communis, *Linné*, var. α amara, β dulcis, *De Candolle*, s. Prunus Amygdalus, *Baillon*. *Natural order*, Rosaceæ, Amygdaleæ.

Habitat.—Western Asia; naturalized in the Mediterranean basin; cultivated.

Description.—Flattish ovate or ovate-lanceolate, 20 to 25 millimeters ($\frac{4}{5}$ to 1 inch) long; testa brown, scurfy, with about 16 longitudinal veins; hilum near the pointed end; chalaza broad at the rounded end; embryo white, oily, consisting of two ovate-lanceolate plano-convex cotyledons and a short projecting conical radicle; inodorous.

Fig. 199.



Almond.—Seed. Section through seed coats and portion of cotyledon.

Amygdala dulcis. Mostly large, and sides rather convex; taste bland.

Amygdala amara. Mostly smaller and flattish; taste bitter; the emulsion with water has an odor resembling that of hydrocyanic acid.

Constituents.—Fixed oil, 45 (in bitter almonds) to 56 per cent. (in sweet almonds), mucilage 3 per cent., sugar 6 per cent., proteids 25 per cent., and in the testa tannin; the proteids consist of amandin and emulsin or synaptase, of which only the former is precipitated by acetic acid. Bitter almonds contain, in addition to these compounds, 1 to 3 per cent. of amygdalin, $C_{20}H_{27}NO_{11}$, which splits into glucose, hydrocyanic acid (1 part from 17 parts amygdalin), and benzaldehyd, C_7H_6O, or oil of bitter almond. The latter (yield about 1 per cent.) in the crude state has the spec. grav. 1.06–1.075; when freed from hydrocyanic acid it is 1.043–1.049.

Properties.—Demulcent, used in emulsion; the bitter almond sedative.

MELO.—MELON SEED.

Origin.—Cucumis Melo, *Linné.* *Natural order*, Cucurbitaceæ.

Habitat.—Central Asia; cultivated.

Description.—About 1 centimeter ($\frac{2}{5}$ inch) long, flattish ovate; testa white or whitish, smooth, the edge rather blunt; hilum near the pointed end: cotyledons plano-convex, white, and oily; inodorous; taste bland.

Constituents.—Fixed oil, proteids.

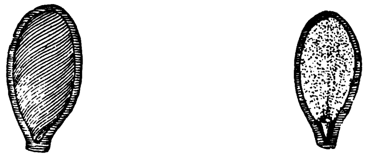
Properties.—Anthelmintic. *Dose*, 30 to 65 grams (℥j–ij), in emulsion.

PEPO.—PUMPKIN SEED.

Origin.—Cucurbita Pepo, *Linné.* *Natural order*, Cucurbitaceæ.

Habitat.—Tropical Asia and America; cultivated.

Fig. 200.



Pepo.—Seed and cotyledon with radicle and plumule.

Description.—Flat, broadly ovate, about 2 centimeters ($\frac{4}{5}$ inch) long; testa white or whitish with a shallow groove and flat ridge parallel to the margin; hilum near the pointed end; cotyledons flat, white, and oily; radicle short, conical; inodorous; taste bland.

Constituents.—Fixed oil 44 per cent., proteids, starch, acrid resin, and sugar.

Properties.—Tænifuge. *Dose*, 30 to 65 grams (℥j–ij), in powder or emulsion.

CUCUMIS.—Cucumber Seed.

Origin.—Cucumis sativus, *Linné.* *Natural order*, Cucurbitaceæ.

Habitat—Central Asia; cultivated.

Description.—Flat and thin, about 8 millimeters ($\frac{1}{3}$ inch) long, ungrooved, acutely edged; otherwise resembling pumpkin seed.

Constituents.—Fixed oils, proteids, etc.

Properties.—Diuretic, anthelmintic. *Dose*, 8 to 65 grams (ʒij–℥ij).

CITRULLUS.—Watermelon Seed.

Origin.—Cucumis (Cucurbita, *Linné*) Citrullus, *Séringe*, s. Citrullus vulgaris, *Schrader.* *Natural order*, Cucurbitaceæ.

Habitat.—Southern Asia; cultivated.

Description.—Flat, ovate, 12 to 15 millimeters ($\frac{1}{2}$–$\frac{3}{5}$ inch) long; testa blackish and marbled, or orange-brown, ungrooved, blunt on the edge; otherwise resembling pumpkin seed.

Constituents.—Fixed oil, 30 per cent., and proteids.

Properties.—Diuretic, anthelmintic. *Dose*, 8 to 65 grams (ʒij–℥ij).

DIPTERIX.—TONCO. TONKA BEAN.

Origin.—1. Dipterix (Coumarouna, *Aublet*) odorata, *Willdenow;* 2. D. oppositifolia, *Willdenow. Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—Guiana.

Description.—Oblong, somewhat compressed, 4 to 6 centimeters (1½ to 2 inches) long, about 1 centimeter (⅖ inch) broad; hilum near the thin end; testa blackish, fragile, thin, somewhat glossy and wrinkled; embryo pale brown, oily; radicle short and thick; cotyledons plano-convex, inclosing a rather large pinnate plumule and acicular crystals; fragrant; taste aromatic bitter.

Varieties.—Dutch Tonka. About 5 centimeters (2 inches) long, frequently covered with a crystalline inflorescence.

English Tonka. About 4 centimeters (1½ inch) long; its surface with little or no efflorescence.

Constituents.—Fixed oil, coumarin, $C_9H_6O_2$, sugar, mucilage. Coumarin is in glossy aromatic prisms, is sparingly soluble in water, and melts at 67° C. (152.6° F.).

Properties.—Stimulant; used only for its flavor.

THEOBROMA.—CACAO.

Origin.—Theobroma Cacao, *Linné. Natural order*, Sterculiaceæ, Buettnerieæ.

Habitat.—Tropical America; cultivated.

Description.—The seeds are either dried when removed from the fruit, or are previously fermented in the sweating-box, or buried in the ground (claying), until the astringency disappears. Ovate or ovate-oblong, 15 to 25 millimeters (⅗ to 1 inch) long; testa reddish-brown to brown-gray, thin, fragile, with numerous longitudinal veins; hilum at the broad end; chalaza at the narrow end; embryo red-brown, oily; radicle short; cotyledons ribbed upon the face, irregularly lobed from the back through the folds of the tegmen, and readily breaking into angular fragments; taste oily, aromatic, and bitterish. Unsweated cacao has a more bitter and astringent taste. 100 parts of cacao yield about 12 parts of shells and 88 parts of kernels.

Constituents.—Fat about 50 per cent., starch 16 per cent., proteids 18 per cent., ash 3.5 per cent., sugar 0.6 per cent., coloring-matter, a little caffeine, and 1.5 to 4.5 per cent. (somewhat less in the testa) of theobromine, $C_7H_8N_4O_2$, which is white, crystalline, bitter, slightly soluble in water, alcohol, and ether, and may be converted into caffeine.

Properties.—Nutritive, stimulant used for preparing chocolate.

PHYSOSTIGMA.—CALABAR BEAN.

Origin.—Physostigma venenosum, *Balfour*. *Natural order*, Leguminosæ, Papilionaceæ.

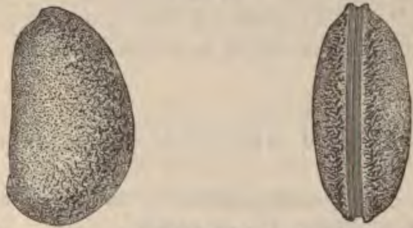
Habitat.—Tropical Western Africa, near the mouth of the Niger and old Calabar.

Description.—Oblong and somewhat reniform, about 25 millimeters (1 inch) long, and 15 millimeters ($\frac{3}{5}$ inch) broad; testa granular, chocolate brown; hilum in a broad black groove extending over the entire length of the convex edge, and having at one end the micropyle, at the other end the chalaza; embryo with a short curved radicle and two large white concavo-convex cotyledons; inodorous, taste bean-like.

On moistening the embryo with solution of potassa, it acquires a pale yellow color.

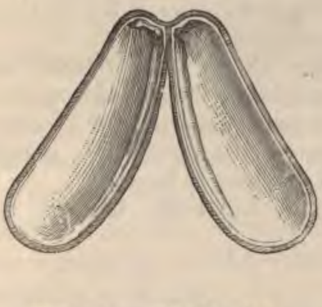
The seed of Physostigma (Mucuna, *Oliver*) cylindrospermum, *Holmes*, is 4 centimeters ($1\frac{3}{8}$ inch) long, nearly cylindrical, has a shorter groove and hilum, otherwise closely resembles the preceding.

Fig. 201.



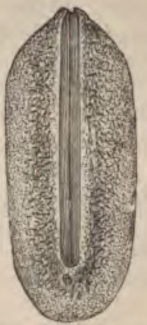
Physostigma.—View from the side and edge, showing length of hilum.

Fig. 202.



Physostigma split, showing cotyledons.

Fig. 203.



Physostigma cylindrospermum.

Constituents.—Physostigmine or eserine, $C_{15}H_{21}N_3O_2$ (amorphous, tasteless, soluble in alcohol, ether, chloroform, benzol, carbon disulphide, less freely in water, reddened by alkalies and by chlorinated lime), calabarine (derivative of physostigmine; tetanic; insoluble in ether), physosterin (indifferent, crystalline), starch 48 per cent., proteids 23 per cent., mucilage, ash 3 per cent.

Properties.—Sedative, poisonous; contracts the pupil. *Dose*, 0.06 to 0.27 gram (gr. j–iv), in powder, tincture, or extract; eserine, 0.001 to 0.005 gram (gr. $\frac{1}{64}$ to $\frac{1}{12}$).

FŒNUM GRÆCUM.—FENUGREEK.

Origin.—Trigonella Fœnum græcum, *Linné*. *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—India, naturalized in the Mediterranean basin; cultivated.

Description.—Rhomboid, about 3 millimeters ($\frac{1}{8}$ inch) long, and 2.5 millimeters ($\frac{1}{10}$ inch) broad, compressed, four-edged; from the hilum on one edge, diagonally furrowed on both sides; testa brownish or yellowish, hard; tegmen (albumen?) colorless, horny; embryo light yellow, oily, the radicle curved upon the edge of the cotyledons; odor peculiar; taste mucilaginous, bitter.

Constituents.—Mucilage 28 per cent. (chiefly in the inner seed coat), fat 6 per cent., volatile oil a trace, proteids 22 per cent., bitter principle, free from starch.

Adulteration.—Powdered fenugreek is sometimes adulterated with ground amylaceous seeds.

Properties.—Demulcent, discutient; used in veterinary practice.

ABRI SEMEN.—PRAYER BEADS, JEQUIRITI.

Origin.—Abrus precatorius, *Linné*. *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—India, naturalized in other tropical countries.

Description.—Subspherical or globular-ovate, about 5 millimeters ($\frac{1}{5}$ inch) long, scarlet-red, with a black spot at the hilum; testa hard; cotyledons plano-convex; radicle short, curved; inodorous; taste bean-like.

Constituents.—Alkaloid, abric acid (crystalline, soluble in alcohol, sparingly soluble in water), fixed oil.

Properties.—Irritating to the eyes; infusion used in granular ophthalmia.

SINAPIS ALBA. WHITE MUSTARD.

Origin.—Sinapis (Brassica, *Hooker filius*) alba, *Linné*. *Natural order*, Cruciferæ, Siliquosæ.

Habitat.—Asia and Southern Europe; cultivated.

Description.—Almost globular, nearly 2 millimeters ($\frac{1}{12}$ inch) in diameter; hilum circular; testa yellowish, finely pitted, hard; embryo greenish-yellow, oily, with a curved radicle and two cotyledons, one folded over the other; inodorous; taste pungent and acrid.

Constituents.—Fixed oil (20–25 per cent., bland), mucilage, myrosin (proteid), sinalbin, $C_{30}H_{44}N_2S_2O_{16}$ (colorless prisms, soluble in water, sparingly soluble in cold alcohol; glucoside yielding sugar, sinapine sulphate, $C_{16}H_{25}NSO_9$, and acrinyl sulphocyanide, C_8H_7NSO; the latter is an acrid non-volatile oil); free from starch.

Properties.—Tonic, laxative, diuretic, stimulant, emetic; externally rubefacient and epispastic. *Dose*, 1 to 4 grams (gr. xv–ʒj), entire, in powder, or infusion; externally as poultice.

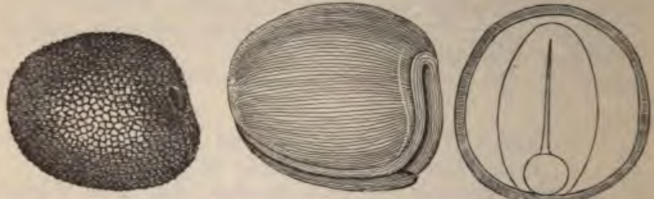
SINAPIS NIGRA.—BLACK MUSTARD.

Origin.—Sinapis (Brassica, *Koch*) nigra, *Linné*. *Natural order*, Cruciferæ, Siliquosæ.

Habitat.—Asia and Southern Europe; cultivated.

Description.—Almost globular, about 1 millimeter ($\frac{1}{25}$ inch) in diameter, with a circular hilum; testa blackish-brown, finely reticulate, hard; embryo greenish-yellow, oily, with a curved radicle and two cotyledons one folded over the other; inodorous when dry, but when moist of a pungent, penetrating, irritating odor; taste pungently acrid.

Fig. 204.



Sinapis.—Entire, magnified. Embryo. Transverse section.

Constituents.—Fixed oil 25 per cent. (bland), mucilage, myrosin (proteid), sinnigrin or potassium myronate, $C_{10}H_{18}NS_2KO_{10}$, about 0.5 per cent. (silky white needles, soluble in water, slightly soluble in absolute alcohol; glucoside, yielding sugar, acid potassium sulphate and allyl sulphocyanide or volatile oil of mustard, C_3H_5CNS; the latter is very pungent and acrid, has the density 1.017, and dissolves in sulphuric acid without coloration); no starch; ash 4 per cent.

Properties and Dose similar to Sinapis alba.

Allied Seeds.—Turnip seed, from Brassica Rapa, *Linné.* Larger than the preceding, nearly black, finely pitted; slightly acrid.

Rape seed, Cole or Colza seed, from Brassica Napus, *Linné.* Larger than turnip seed, finely pitted, blue-black, slightly acrid.

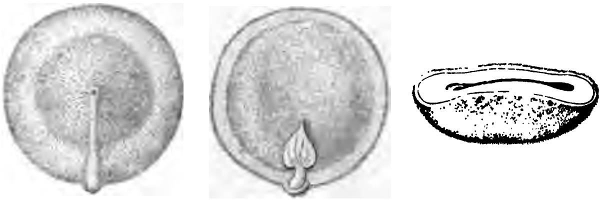
NUX VOMICA.—Nux Vomica.

Origin.—Strychnos Nux vomica, *Linné. Natural order*, Loganiaceæ.

Habitat.—India and East India Islands.

Description.—Orbicular, about 25 millimeters (1 inch) in diameter, grayish or greenish-gray; soft-hairy, of a silky lustre, with a slight ridge (raphe) extending from the centre of one side to the edge; albumen horny, whitish, somewhat translucent, very tough, with a large circular cavity, into which the heart-shaped nerved cotyledons project; inodorous, persistently bitter.

Fig. 205.



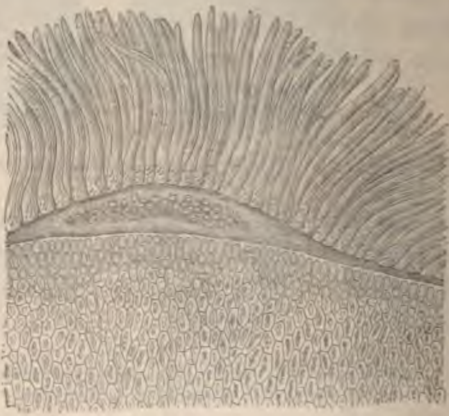
Nux vomica.—Whole seed; cut longitudinally; cut transversely.

Constituents.—Alkaloids (total amount 2.7–3.9 per cent.), strychnine, $C_{21}H_{22}N_2O_2$, $\frac{1}{4}$–$\frac{1}{2}$ per cent., brucine, $C_{23}H_{26}N_2O_4$, $\frac{1}{2}$–1 per cent., and igasurine (probably impure brucine), combined with igasuric acid (dark green by ferric salts); proteids 11 per cent., fat, gum, sugar 6 per cent.

Strchynine is in four-sided prisms, insoluble in ether, soluble in 5 parts of chloroform and in 110 parts of cold 90 per cent. alcohol. Sulphuric acid with potassium bichromate colors deep violet or blue; similar color by sulphuric acid and lead peroxide or potassium ferricyanide, changing to red and yellow; its salts are very bitter.

Brucine is in rectangular octahedra, containing $4H_2O$, is readily soluble in alcohol and in 7 parts of chloroform; nitric acid colors blood-red, changing to orange and yellow; its salts are very bitter.

Fig. 206.



Nux vomica.—Section through hilum and albumen, magnified 60 diam.

Properties.—Tonic, spinal nervine, poisonous. *Dose,* 0.03 to 0.3 gram (gr. ss–v), in tincture or extract. Strychnine, 0.001 to 0.01 gram (gr. $\frac{1}{64}$–$\frac{1}{6}$).

IGNATIA.—BEAN OF ST. IGNATIUS.

Origin.—Strychnos Ignatia, *Lindley*, s. Ignatiana philippinica, *Loureiro*. *Natural order*, Loganiaceæ.

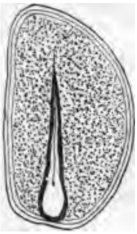
Habitat.—Philippine Islands.

Description.—Oblong or ovate, irregularly angular, about 3 centimeters ($1\frac{1}{8}$ inch) long, dull brownish or blackish, very hard, horny; hilum at one end; fracture granular, irregular; the albumen brownish, somewhat translucent, inclosing an irregular cavity with an oblong embryo; inodorous, very bitter.

Constituents.—Strychnine 0.5 to 1.5 per cent., brucine 0.5 to 1.4 per cent., proteids 10 per cent., fat, etc.

Properties.—Like nux vomica. *Dose,* 0.03 to 0.2 gram (gr. ss–iij).

Fig. 207.



Ignatia.—Vertical section.

DELPHINIUM.—LARKSPUR SEED.

Origin.—Delphinium Consolida, *Linné.* *Natural order,* Ranunculaceæ, Helleboreæ.

Habitat.—Central Europe; cultivated.

Description.—Flattish tetrahedral, 1 to 1.5 millimeter ($\frac{1}{25}$ to $\frac{1}{16}$ inch) broad, acute on the edges; testa black, roughly pitted; albumen whitish, oily, inclosing a small straight embryo; inodorous, taste bitter and acrid.

Constituents.—Fixed oil, probably also delphinine.

Properties.—Diuretic, cathartic, emetic, poisonous; externally rubefacient; rarely employed.

STAPHISAGRIA. STAVESACRE.

Origin.—Delphinium Staphisagria, *Linné.* *Natural order,* Ranunculaceæ, Helleboreæ.

Description.—Flattish tetrahedral, about 5 millimeters ($\frac{1}{5}$ inch) long and 3 or 4 millimeters ($\frac{1}{8}$ or $\frac{1}{6}$ inch) broad, one side convex, testa brown or brown-gray, with reticulate ridges; albumen whitish, oily, inclosing a straight embryo; nearly inodorous; taste bitter and biting.

Constituents.—Delphinine (white, crystalline, acrid), delphinoidine (amorphous) delphisine (crystalline); the three alkaloids soluble in alcohol, ether and chloroform, the last two becoming brown by sulphuric acid; staphisain (yellow, insoluble in ether, acrid), fixed oil 25 per cent., proteids, mucilage; ash 9 per cent.

Properties.—Diuretic, cathartic, emetic, poisonous; externally rubefacient; mostly used for killing vermin.

NIGELLA.—NIGELLA.

Origin.—1. Nigella damascena, *Linné.* 2. N. sativa, *Linné.* *Natural order*, Ranunculaceæ, Helleboreæ.

Habitat.—Levant and Southern Europe, cultivated.

Description.—1. Triangular-ovate, 2.5 millimeters ($\frac{1}{10}$ inch) long, finely pitted, dull-black; testa brittle; albumen oily; embryo straight, small, in the pointed end; odor on rubbing strawberry-like; taste bitter, somewhat acrid; imparts fluorescence to petroleum benzin. No. 2. Similar, but netted-wrinkled, rounded at the edges, odor on rubbing cajuput-like; benzin not rendered fluorescent.

Constituents.—Fixed oil, volatile oil (odor different from that of the seeds), in No. 2 also melanthin (acrid, glucoside, soluble in alcohol, red or violet by H_2SO_4).

Properties.—Emmenagogue, diuretic, expectorant; rarely used.

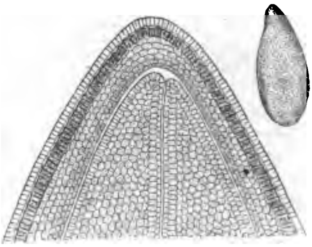
LINUM.—FLAXSEED.

Origin.—Linum usitatissimum, *Linné.* *Natural order* Linaceæ.

Habitat.—Levant and Southern Europe; cultivated and spontaneous in most temperate countries.

Description.—Flattish ovate or oblong ovate, about 5 millimeters ($\frac{1}{5}$ inch) long, obliquely pointed at one end; testa brown, glossy, very finely pitted, covered with a transparent mucilaginous epithelium, which swells considerably in water; hilum near the pointed end; embryo whitish, oily; cotyledons large, plano-convex, covered with a thin albumen; inodorous, mucilaginous, oily, and bitter.

Fig. 208.



Flaxseed.—Entire, magnified 3 diam. Transverse section near the edge, magnified 65 diam.

Constituents.—Fixed oil 30–35 per cent. (in the nucleus), mucilage 15 per cent. (in the epithelium), proteids 25 per cent., resin, wax, sugar, ash 3 per cent.

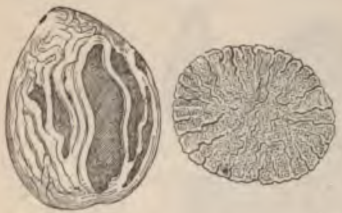
Properties.—Demulcent. *Dose*, 4 to 10 grams (ʒj–ijss) or more, in infusion; externally as poultice.

MYRISTICA.—Nutmeg.

Origin.—Myristica fragrans, *Houttuyn* (M. moschata, *Thunberg*, M. aromatica, *Lamarck*, M. officinalis, *Linné filius*). *Natural order*, Myristicaceæ.

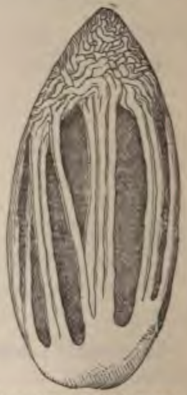
Habitat.—Molucca Islands; cultivated in tropical countries.

Fig. 209.



Nutmeg, with mace and transverse section.

Fig. 210.



Wild nutmeg, with mace.

Description.—Roundish-ovate, about 25 millimeters (1 inch) long; deprived of the brittle woody testa, which shows shallow impressions from mace; kernel externally light brown, reticulately furrowed; internally of a fatty lustre, pale brownish with dark brown veins containing the folds of the inner seed-coat; hilum and micropyle on the broad end, chalaza near the upper end, united by a groove corresponding to the raphe; embryo small, in a cavity at the base; strongly aromatic, somewhat bitter.

Varieties.—Limed or Dutch nutmegs; covered with a white powder, lime.

Penang and Singapore nutmegs; unlimed.

False nutmegs. Myristica fatua, *Houttuyn*, wild or male nutmegs; 4 to 5 centimeters (1½ to 2 inches) long; kernel pale colored, scarcely aromatic.

Torreya californica, *Torrey* (*Natural order*, Coniferæ), testa smooth, brittle; kernel oblong, marbled, terebinthinate.

Constituents.—Volatile oil 2 to 8 per cent., fixed oil 25 to 30 per cent., starch, proteids, mucilage. Volatile oil of nutmeg has the spec. grav. 0.93, and consists of myristicene, $C_{10}H_{16}$, and a little myristicol, $C_{10}H_{14}O$. Expressed oil of nutmeg consists of myristin, with another fat, resinous matter, and volatile oil.

Properties.—Stimulant, stomachic. *Dose*, 0.5 to 1.5 gram (gr. viij–xxij).

RICINUS.—Castor Oil Seed.

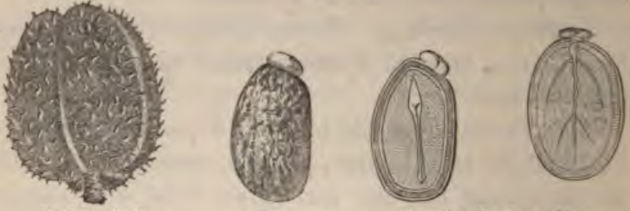
Origin.—Ricinus communis, *Linné*. *Natural order*, Euphorbiaceæ.

Habitat.—India; cultivated in tropical and warm temperate countries.

Description.—Variable in size and color; about 15 millimeters (⅗ inch) long, and 6 millimeters (¼ inch) broad, oval oblong, flattened on the ventral surface; on one end with a whitish caruncle, covering the hilum and micropyle; chalaza near the broader end; raphe on the flat side; testa glossy, grayish or pale grayish-brown variegated with red-brown; tegmen white, thin, adhering to the white oily albumen; embryo straight, with a short conical radicle and two thin broad cotyledons; inodorous; taste oily, acrid.

Constituents.—Fixed oil 45 to 50 per cent. (see Oleum ricini), ricinin (crystalline), proteids 20 per cent., mucilage, sugar, a poisonous principle (not isolated), ash (testa 10 per cent., kernel 4 per cent.).

Fig. 211.



Ricinus fruit. Seed. Longitudinal sections.

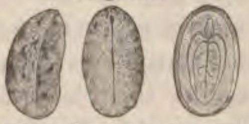
Properties.—Violently cathartic and emetic; used for preparing castor oil.

TIGLIUM.—Croton Seed.

Origin.—Croton Tiglium, *Linné*, s. Tiglium officinale, *Klotzsch*. *Natural order*, Euphorbiaceæ.

Habitat.—India; cultivated.

Fig. 212.



Croton Tiglium.—Lateral and ventral view, and longitudinal section of seed.

Description.—About 12 or 15 millimeters (½ or ⅗ inch) long; oval oblong, somewhat quadrangular; surface dull gray-brown, or mottled with black from the removal of the outer coat; otherwise like castor oil seeds.

Constituents.—Fixed oil 50 to 60 per cent. (see Oleum tiglii), proteids, ash 3 per cent.

Properties.—Violently drastic; used for preparing croton oil.

CURCAS.—PURGING NUT.

Origin.—Curcas purgans, *Adanson*, s. Jatropha Curcas, *Linné*. *Natural order*, Euphorbiaceæ.

Habitat.—Tropical America; naturalized in other tropical countries.

Description.—About 20 millimeters (⅘ inch) long; resembles croton seed, but the testa is dull black and marked with numerous small fissures; taste less acrid.

Constituents.—Fixed oil 40 per cent. (yellowish or colorless, vesicating), proteids, etc.

Properties.—Drastic and emetic; similar to, but milder than croton seed.

CAFFEA.—COFFEE.

Origin.—Coffea arabica, *Linné*. *Natural order*, Rubiaceæ, Coffeæ.

Habitat.—Tropical Africa; cultivated in tropical countries.

Description.—Elliptic or oval from 8 to 12 millimeters (⅓ to ½ inch) long, yellowish or bluish-gray, plano-convex, on the flat side with a longitudinal groove, penetrating with a curve deeply into the horny albumen; somewhat oblique on one end; hilum near the groove beneath the rounded end; testa membranous, usually wanting on the back; embryo small at the oblique end, slightly curved under the convex side; odor faint, peculiar; taste somewhat bitter, astringent.

Varieties.—The cultivated varieties vary in size, color, and flavor. The large and well-flavored Liberian coffee is obtained from Coffea liberica, *Hiern.*

Constituents.—Fat 13 per cent., glucose and dextrin 15 per cent., proteids 13 per cent., caffeine about 1 per cent., caffeotannic acid, trace of volatile oil, ash 5 to 8 per cent. Caffeine, $C_8H_{10}N_4O_2$, is methyltheobromine, in white silky needles, faintly bitter, soluble in water, more so in alcohol and chloroform; on boiling with barium hydrate converted into carbonic anhydrid, CO_2, and caffeidine, $C_7H_{12}N_4O$, and the latter ultimately into sarkosine, formic acid, methylamine, and ammonia.

Caffeotannin is amorphous, yields with liquid potassa yellow crystalline caffeic acid, and with fusing potassa protocatechuic acid.

By the roasting of coffee the fat and tannin are destroyed, caffeine is slowly volatilized, and empyreumatic volatile oils are produced.

Properties.—Tonic, stimulant, nervine, antiemetic. *Dose*, 4 to 16 grams (ʒj–iv), in infusion; caffeina 0.1 to 0.2 gram (gr. jss–iij).

STRAMONII SEMEN.—STRAMONIUM SEED.

Thornapple seed.

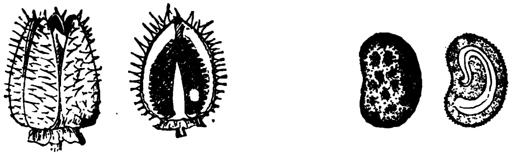
Origin.—Datura Stramonium, *Linné. Natural order*, Solanaceæ.

Habitat.—Asia; naturalized in most countries.

Description.—Reniform, flattened, about 4 millimeters (⅛ inch) long; hilum and micropyle on the concave edge; testa dull brownish-black, pitted, and wrinkled; albumen whitish, oily, inclosing a cylindrical embryo curved parallel with the edge of the seed; inodorous; taste oily and bitter.

Constituents.—Fixed oil 25 per cent., resin, mucilage, proteids, ash 3 per cent., daturine 0.3 per cent. (mixture of hyoscyamine and atropine).

Fig. 213.



Stramonium.—Capsule and longitudinal section.

Stramonium seed and section, magnified 3 diam.

Properties.—Diuretic, dilating the pupil, narcotic. *Dose*, 0.06 to 0.2 gram (gr. j–iij), in powder, tincture, or extract.

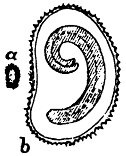
HYOSCYAMI SEMEN.—HYOSCYAMUS SEED.

Origin.—Hyoscyamus niger, *Linné.* *Natural order*, Solanaceæ.

Habitat.—Europe and Asia; naturalized in some parts of North America.

Description.—Roundish-reniform, flattened, 1 to 1.5 millimeter ($\frac{1}{25}$ to $\frac{1}{16}$ inch) long; hilum and micropyle on the concave edge; testa finely pitted, roughish, light gray-brown; albumen whitish, oily, inclosing a cylindrical embryo curved parallel with the edge of the seed, but with the tip of the cotyledons incurved; inodorous; taste oily, bitter, somewhat acrid.

Fig. 214.



Hyoscyamus seed.—
a. Slightly magnified.
b. Section.

Constituents.—Fixed oil 25 per cent., resin, mucilage, proteids, little hyoscyamine (see Hyoscyami folia).

Properties.—Anodyne, hypnotic, dilating the pupil, narcotic. *Dose*, 0.1 to 0.3 gram (gr. jss–v), in powder or emulsion.

PAPAVER.—POPPY SEED, MAW SEED.

Origin.—Papaver somniferum, *Linné. Natural order*, Papaveraceæ.

Habitat.—Western Asia; cultivated.

Description.—Reniform, 1 to 1.5 millimeter ($\frac{1}{25}$ to $\frac{1}{16}$ inch) long; testa varying in color, bluish, blackish, or whitish, with shallow pits; albumen whitish, oily, inclosing a cylindrical semilunar embryo; inodorous; taste oily.

Constituents.—Fixed oil 45 to 50 per cent., proteids, mucilage, morphine 0.05 per cent.

Properties.—Demulcent, mild anodyne. *Dose*, 1 to 4 grams (gr. xv–ʒj), in emulsion.

SABADILLA.—CEVADILLA.

Origin.—Asagræa (Helonias, *Don*) officinalis, *Lindley*, s. Veratrum Sabadilla, *Schlechtendal. Natural order*, Liliaceæ, Melanthieæ.

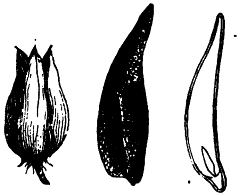
Habitat.—Mexico to Venezuela.

Description.—Narrow-oblong or lance-linear, about 6 millimeters ($\frac{1}{4}$ inch) long, rounded below, rather beaked above, somewhat angular; testa brownish-black, rugosely wrinkled; albumen whitish and oily, with a small linear embryo near the base; inodorous, bitter, persistently acrid, sternutatory.

The papery follicles sometimes present should be rejected.

Constituents. — Veratrine, $C_{37}H_{53}NO_{11}$, cevadine, $C_{32}H_{49}NO_9$, cevadilline, $C_{34}H_{53}NO_8$, cevadic acid (sublimable, odor of butyric acid), veratric acid (sublimable in prisms), fixed oil. Veratrine (of Wright and Luff) is amorphous, and by potassa is split into veratric acid and verine, $C_{28}H_{45}NO_8$. Cevadine (Merck's veratrine) crystallizes in prisms, and by potassa is split into cevadic acid and cevine, $C_{27}H_{43}NO_8$. Medicinal veratrine is a white powder, acrid, sternutatory, readily soluble in alcohol, ether, and chloroform, less freely soluble in glycerin and olive oil, and is colored yellow and deep red by sulphuric acid, yellow by nitric acid, and deep red by hot hydrochloric acid.

Fig. 215.



Sabadilla.—Fruit natural size; seed and longitudinal section, magnified.

Properties.—Powerful irritant; used for preparing veratrine, and for killing vermin. *Dose*, of veratrine, 0.002 to 0.006 or 0.01 gram (gr. $\frac{1}{32}$ to $\frac{1}{10}$ or $\frac{1}{6}$), in pills; mostly externally in ointment.

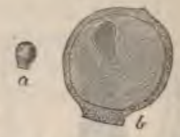
COLCHICI SEMEN.—Colchicum Seed.

Origin.—Colchicum autumnale, *Linné*. *Natural order*, Liliaceæ, Melanthieæ.

Habitat.—Europe, in meadows.

Description.—Subglobular, about 2 millimeters ($\frac{1}{12}$ inch) thick; hilum circular, furnished with a soft caruncle; testa dull reddish-brown, finely pitted; albumen whitish, oily, hard, and tough, inclosing a small embryo nearly opposite the hilum; inodorous; taste bitter, somewhat acrid.

Fig. 216.



Colchici semen.—*a.* Natural size. *b.* Section, magnified.

Constituents.—Fixed oil 6 to 8 per cent., gum, sugar, colchicine, and derivatives of the latter. Colchicine, $C_{17}H_{23}NO_6$, is colorless or yellow, amorphous, soluble in water, alcohol, and chloroform, less soluble in ether, of a saffron-like odor and bitter taste, precipitated by tannin, turns moist litmus paper slowly blue, and in aqueous solution is colored yellow by hydrochloric acid. Colchicein, $C_{17}H_{21}NO_5.2H_2O$, is in white crystals, inodorous, soluble in alcohol, chloroform, and hot water, colored green by ferric chloride, and, after several days' standing, precipitated by tannin. Colchicoresin, $C_{51}H_{60}N_2O_{15}$, is brown, amorphous, soluble in chloroform and alcohol, insoluble in ether, and very sparingly soluble in cold water. Beta-colchicoresin, $C_{34}H_{39}NO_{10}$, is blackish-brown, soluble in strong alcohol and chloroform, and insoluble in water and ether. The last two principles are not, or but slightly, affected by tannin, are colored brown-green by ferric chloride, and dissolve in potassa with a brown color. Colchicine and colchicein yield with potassa a yellow solution. The four principles yield with sulphuric acid and potassium nitrate a deep blue or purplish-blue color, and when this has disappeared, concentrated potassa solution gives a more permanent brick-red color. They are extracted from the unbroken seeds by digestion with alcoholic liquids, while maceration in the same exhausts only about two-thirds of the principles.

Properties.—Cathartic, emetic, sedative; in gout and rheumatism. *Dose*, 0.1 to 0.3 or 0.5 gram (gr. jss–v–viij), in powder, tincture, wine, or fluid extract.

GRANUM PARADISI.—Grain of Paradise.

Origin.—1. Amomum Granum-paradisi, *Afzelius.* 2. Am. Melegueta, *Roscoe.* *Natural order*, Zingiberaceæ.

Habitat.—Western Africa.

Description.—Roundish-angular, 2 to 3 millimeters ($\frac{1}{12}$ to $\frac{1}{8}$ inch) long; hilum at the slightly conical end, rather broad and depressed (Granum-paradisi), or grayish tufted (Melegueta); testa reddish-brown, finely warty; albumen whitish, mealy, and oily, inclosing a small embryo; odor slightly spicy; taste pungent, pepper-like.

Constituents.—Volatile oil 0.3 per cent., acrid resin, starch, gum, ash 2 to 3 per cent.

Properties.—Stimulant; used mainly in cattle powder, and for imparting artificial strength to spirits.

ARECA.—Areca Nut.

Origin.—Areca Catechu, *Linné. Natural order*, Palmaceæ.

Habitat.—East Indies; cultivated.

Description.—Roundish conical, about 25 millimeters (1 inch) long, flattish at the hilum, externally brown, veined, internally horny, white, with dark brown veins; embryo near the hilum, small, conical; odor faint; taste slightly astringent.

Constituents.—Fat 14 per cent., tannin, resin, mucilage, ash 2.2 per cent.

Properties.—Astringent, tænifuge. *Dose*, 8 to 12 grams (ʒij–iij).

12. CELLULAR DRUGS NOT READILY RECOGNIZED AS DISTINCT ORGANS OF PLANTS.

This class embraces excrescences, hairs, glands, sporules, and such other vegetable drugs which do not belong to any of the preceding classes, and do not constitute a distinct organ of a plant, or are not readily recognizable as such. The starches, though not truly cellular, but being of a definite shape, are embraced in this class.

Classification.

Sect. 1. Not farinaceous.	
Globular, tuberculated above.	Galla.
Irregular-ovate, tuberculated or lobed, hollow; shell thin.	Gallæ chinenses et japonicæ.
Irregular pieces, white, friable, very bitter.	Fungus laricis.
Felt-like pieces, soft, brown, glossy, tasteless.	Fungus chirurgorum.

Irregular-globose, falling into a brown-black powder.	Ustilago.
Narrow oblong and subtriangular, three-grooved.	Ergota.
Cylindrical, brownish, horn-like.	Laminaria.
Cylindrical, white, spongy, mucilaginous.	Sassafras medulla.
Flat, divided into narrow bands, aromatic.	Macis.
Thread-like, notched above, orange-brown red.	Crocus.
Long, silky, thread-like, yellowish.	Stigmata maydis.
Curling, white filaments; under the microscope band-like.	Gossypium.
Curling, brown, glossy filaments, under the microscope jointed.	Cibotium.
Stiff, brown-red, under the microscope retrorsely serrate.	Mucuna.
Pulverulent, brick-red, consisting of hairs and glands.	Kamala.
brown or dark purple, mixed with wood fibres.	Araroba.
brown-yellow, aromatic, under the microscope subglobular or hood-shaped.	Lupulina.
pale yellow, tasteless, under the microscope tetrahedral.	Lycopodium.
Viscid liquid, containing roundish cells.	Fermentum.
Sect. 2. Farinaceous.	
I. Unaltered starch granules, consisting of more or less distinct layers.	Amylum.
II. Granules partly altered.	
Globular grains; granules oblong, truncate.	Sago.
Irregular lumps; granules muller-shaped.	Tapioca.
III. Granules wholly or partly inclosed in tissue.	
Globular grains with a brown groove; granules similar to wheat starch.	Hordeum.
Meal; granules polyhedral, small, united to globules.	Avena.

GALLA.—Nutgall.

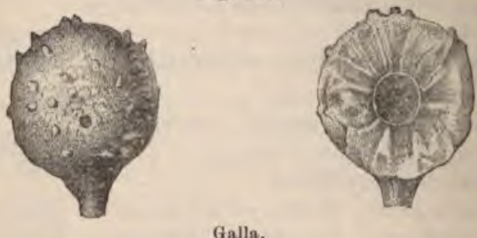
Origin.—Excrescences on Quercus lusitanica, *Webb*, var. infectoria, *De Candolle*, s. Q. infectoria, *Olivier*. *Natural order*, Cupuliferæ, caused by the punctures and deposited ova of Cynips gallæ tinctoriæ, *Olivier*. *Class*, Insecta. *Order*, Hymenoptera.

Habitat.—Levant.

Description.—Subglobular, 2 centimeters ($\frac{4}{5}$ inch) or less in diameter, with a short stipe, more or less tuberculated above, otherwise smooth; heavy, hard, often with a circular hole near the middle, blackish-olive-green or blackish-gray; fracture granular, grayish; in the centre a cavity containing either the partly developed insect or pulverulent remains left by it; nearly inodorous; taste strongly astringent.

Light, spongy, and whitish-colored nutgalls should be rejected.

Fig. 217.



Galla.

Entire. Section.

Varieties.—Aleppo or Syrian nutgalls, dark colored and heavy.

Smyrna nutgalls, of a grayish-olive color, intermixed with white galls.

Sorian nutgalls, size of a pea; blackish.

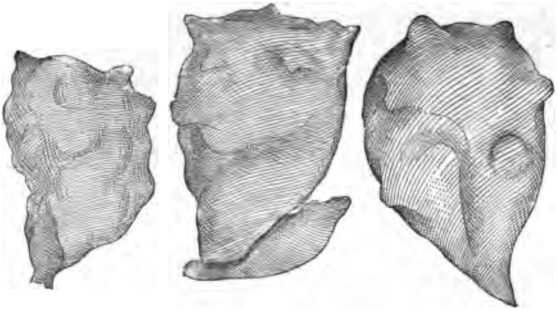
Indigenous nutgalls, globular, smooth, or tuberculate, white or blackish, spongy or firm, varying according to origin; the galls of Quercus virens, *Aiton*, are of a firm texture, dark color, and rich in tannin (40 per cent.).

California oak balls, from Quercus lobata, *Engelmann*, are globular, 5 centimeters (2 inches) in diameter, orange-brown, internally white and spongy; very astringent.

Chinese nutgalls, from Rhus semialata, *Murray*, by the sting of Aphis chinensis, *Bell;* about 4 or 5 centimeters (1½ to 2 inches) long, ovate, but very irregular, tuberculate, grayish-downy, hollow; shell thin, fragile, inclosing the remnants of numerous insects.

Japanese nutgalls, from Rhus semialata or an allied species; about 2 to 3 centimeters (⅘ to 1⅕ inch) long, usually lobed, and the lobes tuberculate, densely pubescent; contains starch granules; otherwise like the preceding.

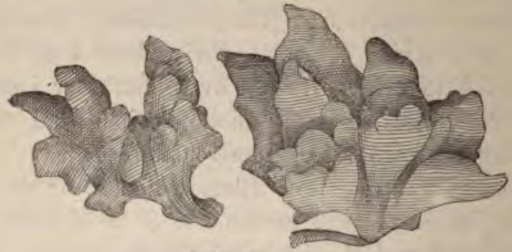
Fig. 218.



Gallæ chinenses.

Constituents.—Tannin 50 to 60 per cent. (white galls about 30 per cent.), gallic acid 2 to 3 per cent., mucilage, sugar, resin, and, in the nucleus, starch. Tannin, gallotannic acid or digallic acid, $C_{14}H_{10}O_9$, is yellowish-white, amorphous, insoluble in absolute ether, soluble in glycerin, alcohol, and water, precipitated blue-black by ferric salts and white by gelatin. Commercial tannin contains a little odorous and coloring matter and variable quantities of glucose. Gallic acid, $C_7H_6O_5.H_2O$, is in white silky needles, soluble in alcohol, less so in ether, and sparingly soluble in cold water; is precipitated blue-black by ferric salts, the color disappearing on boiling, and is not affected by gelatin, except in presence of gum. The tannin of Chinese nutgalls differs somewhat from that of the officinal nutgalls.

Fig. 219.



Gallæ japonicæ.

AGARICUS ALBUS.—Fungus Laricis, White Agaric.

Origin.—Polyporus officinalis, *Fries*, s. Boletus laricis, *Jacquin*. *Natural order*, Fungi, Hymenomycetes.

Habitat.—Asia and Europe, on the larch (Larix).

Description.—Deprived of the outer rind; hoof-shaped or conical, about 15 centimeters (6 inches) broad, usually in irregular pieces, white, light, somewhat fibrous and spongy, very friable, but not readily pulverizable; odor faint; taste sweetish, acrid, and very bitter.

Constituents.—Laricin (white, amorphous, bitter, forms a jelly with water), bitter resin (brown-red, soluble in cold alcohol, chloroform, benzol, etc.), resins sparingly soluble in cold alcohol, sugar (mannit?), and agaric, fumaric, citric, and malic acids.

Properties.—Antisudoral, purgative, in large doses emetic. *Dose*, 0.2 to 0.6 gram (gr. iij–x) in powder, tincture, or extract.

FUNGUS CHIRURGORUM.—SURGEON'S AGARIC.

Origin.—Polyporus (Boletus, *Linné*) fomentarius, *Fries*. *Natural order*, Fungi, Hymenomycetes.

Habitat.—Europe, on the oak (Quercus) and beech (Fagus).

Description.—Deprived of the harder rind, cut into slices, boiled in lye, washed and beaten. Felt-like, soft-velvety pieces, brown, glossy, nearly inodorous, tasteless; consists of interlaced filiform cells. Impregnated with potassium nitrate it constitutes spunk or touchwood.

Uses.—Externally for arresting hemorrhage.

USTILAGO.—CORNSMUT.

Origin.—Ustilago Maydis, *Léveillé*. *Natural order*, Fungi, Æcidiomycetes.

Habitat.—Upon all parts of Zea Mays, *Linné*, most frequently upon the inflorescence.

Description.—Irregular globose masses, sometimes 15 centimeters (6 inches) in diameter, consisting of a blackish gelatinous membrane, inclosing innumerable brown-black, globular, and nodular spores; odor and taste disagreeable.

Constituents.—Fixed oil 2.5 per cent., probably sclerotic acid, crystalline principle (soluble in carbon disulphide), volatile base, sugar, mucilage, ash 5 per cent.

Properties.—Emmenagogue, parturient. *Dose*, 1 to 2 grams (gr. xv–xxx).

ERGOTA.—ERGOT.

Secale cornutum.

Origin.—Claviceps purpurea, *Tulasne*. *Natural order*, Fungi, Ascomycetes.

Habitat.—In the inflorescence of Secale cereale, *Linné*, and other grasses.

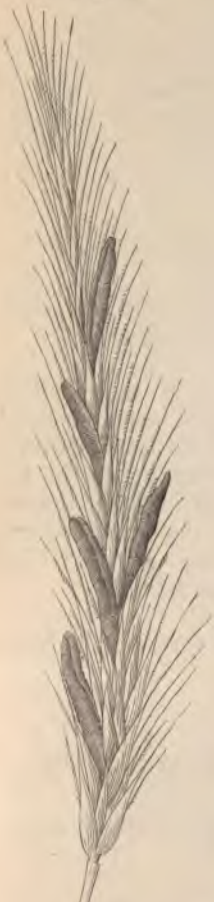
Description.—Somewhat fusiform, obtusely triangular, usually curved, about 25 millimeters (1 inch) long, about 4 millimeters ($\frac{1}{6}$ inch) thick, three-furrowed, obtuse at both ends, purplish-black, internally whitish, breaking with a short fracture; odor peculiar, heavy, increased by trituration with solution of potassa; taste oily, unpleasant.

Ergot grows from a loose white mycelium, which in its early stage is accompanied by an unpleasantly sweet mucus, and penetrates into the ovary. In the following spring stiped fruit-heads are produced, containing numerous bottle-shaped conceptacles (peritheciæ) with fusiform spore-sacs (asci) inclosing 8 filiform spores.

Ergot should be kept in a dry place, and renewed every year.

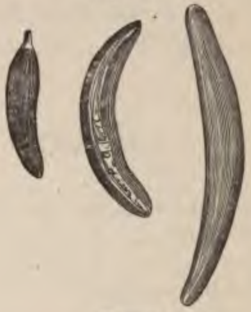
Constituents.—Fixed oil 30 per cent., mycose, proteids, sclerotic acid 4 per cent. (brownish, tasteless, soluble in water, ecbolic), scleromucin 2–3 per cent. (brown, tasteless, after drying insoluble in water; ecbolic), sclererythrin $\frac{1}{100}$ per cent. (soluble in [illegible] with a deep red color), scleroiodin (violet in alkalies), picrosclerotin (poisonous), sclerocrystallin and scleroxanthin (crystalline, inert), ecboline and ergotine (probably identical, and,

Fig. 220



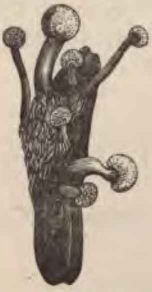
Ergotized rye.

Fig. 221



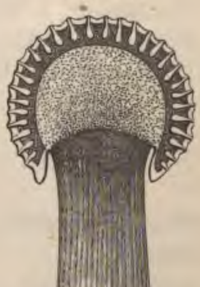
Ergota.

Fig. 222.



Ergot with fruit-heads.

Fig. 223.



Section of head, showing conceptacles.

when pure, inert), ergotinine $\frac{1}{20}$ per cent. (crystalline alkaloid, fluorescent, by sulphuric acid red, violet, and blue).

Bonjean's ergotin is the aqueous extract of ergot, precipitated by alcohol, and evaporated.

Properties.—Emmenagogue, ecbolic, parturient, hemostatic, poisonous. *Dose*, 0.3 to 1.5 gram (gr. v–xxij), in powder (freshly prepared), infusion, wine, or fluid extract; ergotin 0.06 to 0.2 gram (gr. j–iij).

LAMINARIA.—LAMINARIA.

Origin.—Laminaria Cloustoni, *Edmonston*, s. L. digitata, *Lamouroux*. *Natural order*, Algæ, Fucoideæ.

Habitat.—North Atlantic Ocean.

Description.—The stipitate portion of the plant is used. Cylindrical pieces about 1 centimeter ($\frac{2}{5}$ inch) thick, deeply wrinkled, brownish or brown, often with a saline efflorescence, horn-like, sometimes hollow in the centre (from old plants); after soaking in water brown-green, elastic, and four or five times the former thickness; in the outer layer with large mucilage cells; odor slight seaweed-like; taste mucilaginous, saline.

Constituents.—Mucilage, mannit, salts.

Properties.—Absorbent, dilatant; turned cylindrical or conical, used as tents.

SASSAFRAS MEDULLA.—SASSAFRAS PITH.

Origin.—Sassafras officinalis, *Nees*. *Natural order*, Lauraceæ.

Habitat.—North America.

Description.—Slender cylindrical pieces, often curved or coiled, light, spongy, white, inodorous, insipid.

Constituents.—Mucilage; from its aqueous solution it is not precipitated by alcohol or subacetate of lead.

Properties.—Demulcent; used mostly in collyria.

MACIS.—Mace.

Origin.—Myristica fragrans, *Houttuyn.* *Natural order*, Myristicaceæ.

Habitat.—Molucca Islands; cultivated in the tropics.

Description.—It is the arillus of nutmeg. In narrow bands, about 25 millimeters (1 inch) long, somewhat branched and lobed above, united to broader pieces at the base; of a brownish-orange color, fatty when scratched or pressed; fracture short, showing numerous yellow oil cells; fragrant; taste warm, aromatic.

Constituents.—Volatile oil 8 per cent. (mostly macene, $C_{10}H_{16}$, with little oxygenated compound), resin, fat, sugar, mucilage, proteids, no starch granules.

Properties. — Stimulant, tonic; used chiefly for flavoring.

CROCUS.—Saffron.

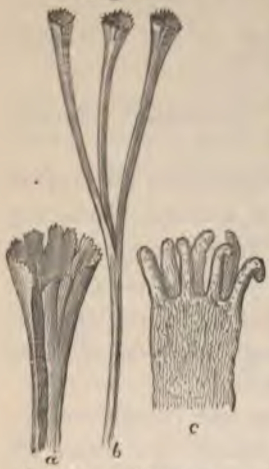
Origin.—Crocus sativus, *Linné.* *Natural order*, Iridaceæ.

Habitat.—Western Asia; cultivated.

Description.—It consists of the stigmas, which are separate, or three, attached to the top of the style, about 3 centimeters (1¼ inch) long, flattish-tubular, almost thread-like, broader and notched above; orange-brown red; odor peculiar, aromatic; taste bitterish and aromatic. When chewed it tinges the saliva deep orange-yellow.

Saffron should not be mixed with the yellow styles. When pressed between filtering paper, it should not leave an oily stain. When soaked in water, it colors the liquid orange-yellow, and should not deposit any pulverulent mineral matter, nor show the presence of organic substances differing in shape from that described.

Fig. 224.



Crocus.—*a*. Stigma, upper part, magnified 4 diam. *b*. Styles with stigmas. *c*. Papillose margin of stigma, magnfied 120 diam.

Varieties.—Commercial saffron is mostly of Spanish or French (Gatinais) origin. African saffron is usually safflower (carthamus). Cape saffron consists of the corolla of Lyperia crocata, *Ecklon. Natural order*, Scrophulariaceæ.

Constituents.—Volatile oil 1 per cent., fixed oil, wax, mucilage, sugar, proteids, ash 5 per cent., and polychroit, $C_{48}H_{60}O_{18}$. The latter is insoluble in ether, soluble in ordinary alcohol and water, and is split into sugar, heavy essential oil, $C_{10}H_{14}O$, and crocin, $C_{16}H_{18}O_6$, which is insoluble in ether, nearly insoluble in water, and is colored blue by sulphuric acid, like polychroit.

Properties.—Diaphoretic, carminative, emmenagogue, anodyne, mildly narcotic. *Dose*, 0.3 to 2 grams (gr. v–xxx), in powder, infusion, tincture, or syrup.

MAYDIS STIGMATA.—CORNSILK.

Origin.—Zea Mays, *Linné.* *Natural order*, Gramінaceæ.

Habitat.—Tropical America; cultivated in the warm temperate zone.

Description.—The stigmas are collected. Fine thread-like, 15 centimeters (6 inches) or more long, about 0.5 millimeter ($\frac{1}{50}$ inch) broad, yellowish or greenish, soft-silky, finely hairy, inodorous, taste sweetish.

Constituents.—Sugar, mucilage, maizenic acid (?).

Properties.—Diuretic, lithontriptic. *Dose*, about 2 grams (ʒss) in decoction or syrup; of the aqueous extract, 0.3 to 0.5 gram (gr. v–viij).

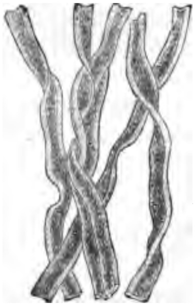
GOSSYPIUM.—COTTON.

Origin.—Gossypium herbaceum, *Linné*, and other species of Gossypium. *Natural order*, Malvaceæ.

Habitat.—Tropical Asia and Africa; cultivated in tropical and subtropical countries.

Description.—The hairs attached to the seeds are used. One-celled filaments, about 2 (short staple) to 4 (long staple) centimeters ($\frac{4}{5}$–1$\frac{3}{5}$ inch) long, and about 0.02 millimeter (0.0008 inch) broad; white, soft, curling, under the microscope appearing as flattened, hollow, and twisted bands, which are spirally striate and slightly thickened at the obtuse edges; inodorous, tasteless, insoluble in water, alcohol, ether, and potassa solution; blackened by warm solution of stannic chloride, not dyed by picric acid, soluble in ammoniacal solution of copper sulphate.

Fig. 225.



Cotton fibres.

Constituents.—Cellulose and fixed oil 9–10 per cent., the latter removed by repeated boiling with caustic alkali (absorbent cotton).

Uses.—For preparing collodion and for surgical dressings.

CIBOTIUM.—Penghawar.

Penghawar-Djambi, Paku-kidang, Pulu.

Origin.—Cibotium Baromez, *Kunze*, Cib. Djambianum, *Hasskarl*, and other species of ferns. *Natural order*, Filices.

Habitat.—Sumatra, Java.

Description.—The chaffy hairs of the bases of the fronds and stem are collected. Curling filaments, about 0.05 millimeter (0.002 inch) broad, glossy, brown or brown-yellow; under the microscope flat and jointed; inodorous, tasteless. Penghawar is about 25 millimeters (1 inch) long, and of a yellowish tint. Paku-kidang, from Alsophila lurida, *Bl.*, etc., is about 5 centimeters (2 inches) long, and of a brown color. Pulu, or Pulupula, from Cibotium glaucum, *Hooker*, etc., is slightly curling and very soft.

Constituents.—Humin compounds, little resin, wax, etc.

Properties.—Hæmostatic through the mechanical absorption of the blood serum.

MUCUNA.—Cowage.

Origin.—Mucuna (Stizolobium, *Persoon;* Dolichos, *Linné*) pruriens, *De Candolle*. *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—East and West Indies.

Description.—The hairs attached to the legumes are used. One-celled, 2 or 3 millimeters ($\frac{1}{12}$–$\frac{1}{8}$ inch) long, stiff, brown-red, under the microscope appearing sharp-pointed, retrorsely serrate, rather thick-walled and partly filled with a brown granular matter. The hairs easily penetrate the skin, causing violent itching.

Constituents.—Little tannin and resin.

Mucuna urens, *De Candolle*, yields shorter and darker hairs, which are equally irritating.

Properties.—Anthelmintic, externally irritant. *Dose*, 0.1 to 0.2 gram (gr. jss–iij), mixed with syrup.

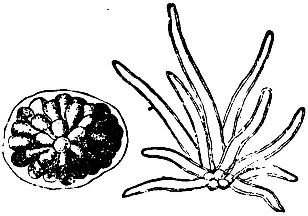
KAMALA.—KAMALA.

Origin.—Rottlera tinctoria, *Roxburgh*, s. Mallotus philippinensis, *Mueller Arg.* *Natural order*, Euphorbiaceæ.

Habitat.—Abyssinia, India, China, Philippine Islands, and Australia.

Description.—The glands and hairs of the capsules are collected. Granular, mobile, brick-red, inodorous and nearly tasteless powder, imparting a deep red color to alkaline liquids, alcohol, ether, and chloroform. Under the microscope it is seen to consist of stellately arranged colorless hairs, mixed with depressed globular glands, containing numerous red club-shaped vesicles. When

Fig. 226.



Kamala.—Magnified 190 diam.

heated in a crucible to redness, it leaves an ash, weighing not over 8 per cent. of the drug.

Constituents.—Resins nearly 80 per cent., one soluble in cold, the other in hot alcohol; rottlerin, $C_{22}H_{20}O_6$ (crystallizing from ether, yellow, easily altered on exposure to air), ash about 4 per cent.

Adulteration.—Earthy matters, sometimes to the extent of 60 per cent.; best detected by incineration.

Properties.—Tænifuge. *Dose*, 4 to 8 or 12 grams (ʒj–ij–iij), in powder or electuary.

ARAROBA.—Goa Powder.

Origin.—Andira Araroba, *Aguiar*. *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—Brazil.

Description.—Collected from radial clefts of the wood. When fresh, light yellow, after exposure ochre-colored, umber-brown, or brown-purple; somewhat crystalline, rough, mixed with wood-fibres; inodorous, bitter. Water dissolves about 7 per cent., the solution being brownish; benzol dissolves about 80 per cent., and subsequently alcohol about 2 per cent.; the insoluble portion consists mostly of wood fibres.

Constituents.—Gummy matter, resin, and chrysarobin $C_{30}H_{26}O_7$ (orange-yellow, crystalline, soluble in ether, benzol, and alkalies; the latter solution is yellow, has a green fluorescence, and becomes red, when it contains chrysophanic acid); ash about 0.5 per cent.

Properties.—Irritant; used externally in skin diseases.

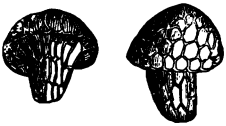
LUPULINUM.—LUPULIN.

Origin.—Humulus Lupulus, *Linné.* *Natural order*, Urticaceæ, Cannabineæ.

Habitat.—Northern temperate zone; cultivated.

Description.—The glands attached to the axis and bracts of the strobiles are collected. Bright brownish-yellow, becoming yellowish-brown; resinous, aromatic, and bitter, consisting of minute granules, which, under the microscope, are subglobular or rather hood-shaped, and reticulate, the lower half being obtusely conical. When agitated with water and allowed to stand, no appreciable sediment consisting of sand should be deposited.

Fig 227.



Lupulin (fresh).

Constituents.—Volatile oil 3 per cent., trimethylamine, lupuline (strongly alkaline liquid, odor of coniine, not bitter), resin, wax (myricin), lupamaric acid, $C_{32}H_{50}O_7$ (bitter prisms, insoluble in water), ash about 5 per cent. The volatile oil, on exposure, yields valerianic acid.

Properties.—Stimulant, tonic, anodyne. *Dose*, 0.2 to 0.5 or 1 gram (gr. iij–viij–xv), in powder, tincture, fluid extract, or oleoresin.

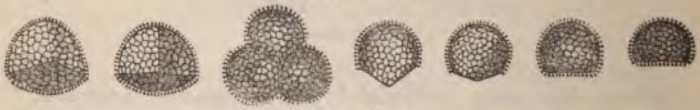
LYCOPODIUM.—LYCOPODIUM.

Origin—Lycopodium clavatum, *Linné*, and other species of Lycopodium. *Natural order*, Lycopodiaceæ.

Habitat.—Europe, Asia, and North America, in dry woods.

Description.—A fine powder, pale yellowish, very mobile, inodorous, tasteless, not wetted by water, burning quickly when thrown into a flame. Viewed under the microscope the granules are seen to be tetrahedral, reticulated, rounded on one side and on the edges with short projections.

Fig. 228.



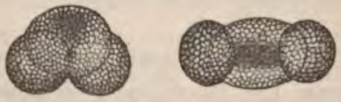
Lycopodium.

Constituents.—Fixed oil 47 per cent., volatile bases in minute quantity; ash 4 per cent.

Uses.—For protecting excoriated surfaces, and for preventing the mutual adhesion of pills.

Adulterations.—Pine pollen consists of an elliptic cell, at both ends of which a globular cell is attached.

Fig. 229.



Pollen of pine.

Starch is colored blue by iodine. Powdered turmeric is colored red-brown by alkalies. Mi [illegible] ixtures subside in carbon disulphide and incr [illegible] of ash.

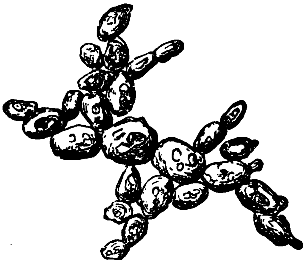
FERMENTUM.—YEAST.

Origin.—Torula (Saccharomyces, *Meyen*), cerevisiæ, *Turpin*. *Natural order*, Fungi, Saccharomycetes.

Habitat.—In fermenting malt liquors.

Description.—A viscid liquid or semifluid frothy mass, containing numerous isolated roundish or oval cells (bottom yeast), or the cells are arranged in short branching rows (top yeast); odor peculiar, taste bitter.

Fig. 230.



Yeast cells.

Properties.—Tonic, stimulating, laxative, antiseptic.

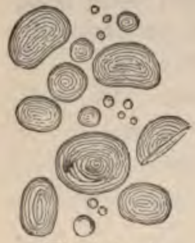
Dose. 30 to 65 grams (℥j–ij); externally for poultices.

AMYLUM.—STARCH.

Origin.—In most vegetables. For medicinal and dietetic purposes, and for uses in the arts, starch is prepared from amylaceous seeds, tubers, rhizomes, and palm stems.

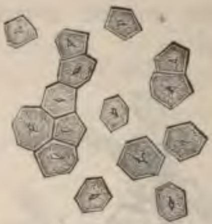
Description.—Fine white powder, sometimes superficially adhering so as to form irregular angular or columnar masses, white, inodorous, tasteless, insoluble in ether, alcohol, and cold water; under the microscope, appearing as minute granules, varying in size and shape according to origin, and consisting of more or less distinct concentric or excentric layers, which are arranged around a cavity called the hilum or nucleus. Its composition is $C_6H_{10}O_5$. Boiled with water the granules are ruptured and dissolve in water, yielding, on cooling, a jelly or mucilaginous liquid acquiring a blue color with iodine. Heated to 180° C. (356° F.) starch is converted into dextrin. Boiled with dilute sulphuric acid, starch yields dextrin and finally glucose.

Fig. 231.



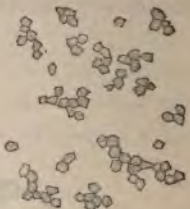
Wheat starch.

Fig. 232.



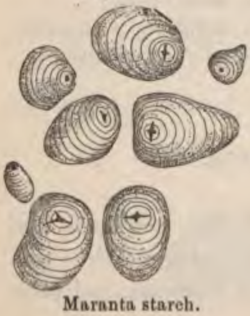
Corn starch.

Fig. 233.



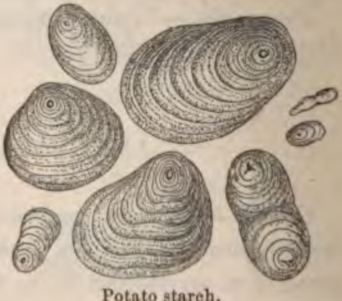
Rye starch.

Fig. 234.



Maranta starch.

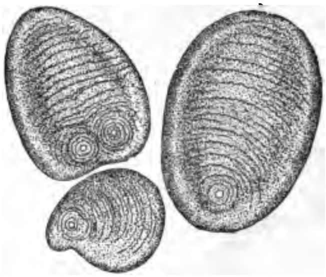
Fig. 235.



Potato starch.

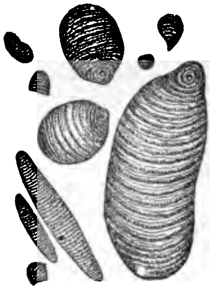
The most important starches found in commerce may be distinguished by the microscopic appearance of the granules, as follows: (The cuts represent the starch granules magnified 250 diameters).

Fig. 236.



Canna starch.

Fig. 237.



Curcuma starch.

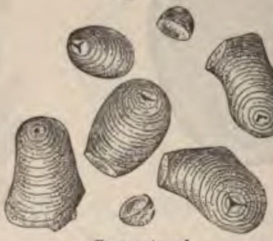
Lenticular, large and minute granules; layers indistinct; hilum slight, near the centre.	Triticum vulgare.
Polyhedric, uniform; size of wheat starch (nearly); hilum central, large.	Zea Mays.
Polyhedric, uniform; much smaller; hilum small.	Oryza sativa.
Ovate; layers delicate, distinct; hilum at broad end, often cleft.	Maranta arundinacea.
Ovate or roundish ovate; larger than preceding; layers very distinct; hilum rather small at the narrow end.	Solanum tuberosum.
Ovate or ovate-oblong; larger than preceding; layers numerous, delicate; hilum inconspicuous, mostly at the narrow end.	Canna spec.
Elliptic, flat, contracted at one end; layers numerous, delicate; hilum small at the narrow end.	Curcuma spec.

SAGO.—Pearl Sago.

Origin.—Metroxylon Sagu, *Rottboell*, and M. Rumphii, *Martius* (Sagus Rumphii, *Willdenow*), and other palms. *Natural order*, Palmæ.

Habitat.—East India Islands; cultivated.

Fig. 238.



Sago starch.

Description.—Globular, pearl-like grains, prepared by granulation with heat; white or brownish, somewhat diaphanous; the unaltered starch granules oblong, elliptic, or ovate, truncate at one end; layers more or less distinct; hilum at the rounded end often cleft.

TAPIOCA.—Tapioca.

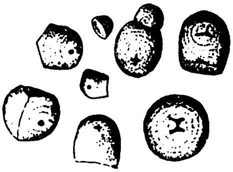
Origin.—Manihot utilissima, *Pohl*, s. Jatropha Manihot, *Linné*, and Manihot Aipi, *Pohl*, s. Jatr. dulcis, *Gmelin*. *Natural order*, Euphorbiaceæ.

Habitat.—Brazil; cultivated in the tropics.

Description.—The starch of the rhizome (cassava starch), while still moist, is dried on heated plates. Irregular lumps, white and opaque or somewhat diaphanous; the unaltered starch granules muller-shaped;

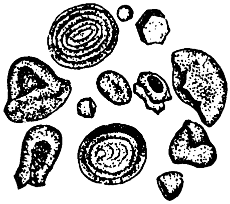
layers indistinct; hilum near the rounded end, small, often cleft.

Fig. 239.



Cassava starch.

Fig. 240.



Altered starch granules from tapioca.

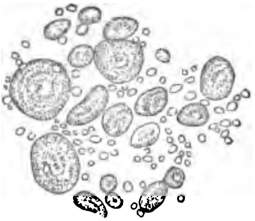
HORDEUM.—Pearl Barley.

Origin.—Hordeum distichum, *Linné*, and other cultivated species of Hordeum. *Natural order*, Graminaceæ.

Habitat.—Asia; cultivated.

Description.—The fruit is almost completely deprived of the integuments. Globular, white, mealy, on one side with a groove, containing remnants of the brown integuments; the starch granules resemble those of wheat, but are rather smaller; a portion of the gluten is present.

Fig. 241.



Barley starch.

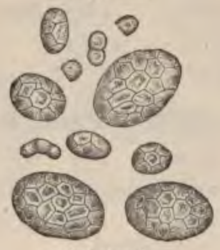
AVENÆ FARINA.—OAT MEAL.

Origin.—Avena sativa, *Linné.* *Natural order*, Graminaceæ.

Habitat.—Probably Asia; cultivated.

Description.—Meal not uniform, grayish-white, containing the gluten and fragments of the integuments; taste bitterish; the starch granules polyhedric, or muller-shaped, often united to subspherical masses; layers scarcely observable; hilum rather distinct.

Fig. 242.



Oat starch.

Properties.—Starches are demulcent; farinaceous substances containing both starch and gluten, are demulcent and nutritive.

PART III.

DRUGS WITHOUT CELLULAR STRUCTURE.

These comprise secretions, exudations, and other organic products which are destitute of cellular structure, though fragments of tissue are in some of them always present, and which, if of animal origin, like some of the fats, are not readily recognized as such.

1. EXTRACTS AND INSPISSATED JUICES. EXTRACTA ET SUCCI INSPISSATI.

These are of a black or brown color, either wholly or partly soluble in water and alcohol, yielding brown-colored solutions; two of the inspissated milk-juices are completely insoluble in both menstruums.

Classification.

Sect. 1. Wholly or partly soluble in water and alcohol.

I. Taste bitter.

Containing fragments of tissue; also starch and tannin; red-brown, black-green by ferric salts. Guarana.

Fragments of tissue; neither starch nor tannin; red-brown, blood-red by ferric salts.	Opium.
Neither tissue, starch, nor tannin; gray-brown, not altered by ferric salts.	Lactucarium.
dark orange-brown, black by ferric salts.	Aloe.
blackish-brown, poisonous.	Curare.
II. Taste sweet.	
Brown-black, glossy.	Extractum glycyrrhizæ.
III. Taste astringent and sweetish.	
Dark brown, more or less glossy; black-green by ferric salts.	Catechu.
Brown, earthy, crystalline; black-green by ferric salts.	Gambir.
Brown-red, angular pieces; black-green by ferric salts.	Kino.
Black-brown, somewhat acrid; blue-black by ferric salts.	Monesia.
Brown-red; violet-black by ferric salts.	Extr. hæmatoxyli.
Sect. 2. Insoluble in water and alcohol.	
Plastic in hot water.	Gutta percha.
Elastic at ordinary temperature.	Elastica.

GUARANA.—GUARANA.

Origin.—Paullinia sorbilis, *Martius.* *Natural order,* Sapindaceæ.

Habitat.—Northern and Western Brazil.

Preparation.—The seeds are powdered, beaten with water into a pasty mass, formed into cakes, and dried by artificial and solar heat.

Description.—Subglobular, elliptic, or cylindrical cakes, hard, dark reddish-brown; fracture uneven, lighter colored, showing fragments of seeds invested with a black testa; odor slight, peculiar; taste astringent and bitter; partly soluble in water and alcohol with a brown color.

Constituents.—Caffeine, $C_8H_{10}N_4O_2$, 4 to 5 per cent., tannin 26 per cent. (coloring ferric salts black-green), starch, mucilage, fat, saponin, resin, volatile oil.

Properties.—Mild astringent, tonic, stimulant, nervine. *Dose,* 0.5 to 4 grams (gr. viij–ʒj), in powder, syrup, or fluid extract. The extract (made with diluted alcohol), 0.2 to 1 gram (gr. iij–xv).

OPIUM.—Opium.

Meconium, Thebaicum, Succus thebaicus.

Origin.—Papaver somniferum, *Linné. Natural order,* Papaveraceæ.

Habitat.—Western Asia; cultivated.

Preparation.—The green capsule is scarified transversely by a one-bladed knife (Asia Minor and Egypt), or longitudinally by a several-bladed knife (India, Japan), the white milk-juice assumes a brown color, thickens, and is then scraped off and formed into cakes. In Asia Minor the cakes are wrapped in a poppy leaf and packed with rumex-capsules; this constitutes the officinal opium.

Description.—Irregular or subglobular cakes, with the remains of poppy leaves and some fruits of a species of rumex adhering to the surface, plastic, and chestnut-brown, or harder, darker, and somewhat shining; internally with some tears and with fragments of vegetable tissue; odor heavy narcotic; taste bitter.

10 grams of opium—previously dried at a temperature of 105° C. (220° F.), exhausted with cold water, and the solution evaporated to dryness—yield an extract weighing between 5.5 and 6 grams (or between 55 and

60 grains from 100 grains of well-dried opium). Opium should contain 10 per cent. of morphine.

Varieties. — Smyrna, Turkey, or Constantinople opium, described above.

Egyptian opium. Flattish cakes, enveloped in poppy leaf, free from rumex fruit; now rarely exported.

Persian opium. Cylindrical sticks, short cones, or small balls of a rather light brown color, wrapped in paper or oftener packed in poppy trash; oily and of rather firm consistence.

East Indian opium. In globular balls weighing about 1900 grams (nearly 4¼ lbs. avoirdupois), and inclosed in a hard shell formed of poppy petals (provision opium); or in flat square or circular cakes wrapped in oiled paper (Abkari opium).

European and American opium, prepared experimentally, but never on a large scale.

Factitious opium has been occasionally met with; it was probably the aqueous extract of the poppy plant, of a blackish-brown color, soft consistence, and deficient in odor and taste.

Adulterations.—Lead balls, shot, pebbles, starch, and gum have been used for the purpose.

Constituents.—Free from starch and tannin. Contains odorous principle, glucose, mucilage, pectin, caoutchouc, wax, fatty matter, coloring principle, ash 6 per cent., meconic acid, $C_7H_4O_7$ (ferric salts produce a deep red color, which is not discharged by hydrochloric acid or mercuric chloride), lactic acid 1¼ per cent., meconin, $C_{10}H_{10}O_4$ (bitter, soluble in alcohol and ether), meconoiosin, $C_8H_{10}O_2$ (red, changing to purple when evaporated with slightly diluted sulphuric acid, while meconin turns green), and numerous alkaloids.

Narcotine, $C_{22}H_{23}NO_7$, 1.3 to 10.9 per cent. Soluble in ether and chloroform; blood-red by a mixture of sulphuric and nitric acids; heated with nitric acid yields opianic acid, meconin, and cotarnine, $C_{12}H_{13}NO_3$, a stronger base.

Morphine, $C_{17}H_{19}NO_3.H_2O$, 2.5 to 15 or 22.8 per cent. Nearly insoluble in ether, chloroform, and benzol, soluble in alkalies; blood-red, orange, then yellow with nitric acid; orange-colored by chlorinated alkalies; deep blue by ferric chloride; liberates iodine from iodic acid; heated with hydrochloric acid under pressure yields apomorphine, $C_{17}H_{17}NO_2$, which is emetic.

Codeine, $C_{18}H_{21}NO_3$, 0.2 to 0.4 per cent. Soluble in ether, chloroform, benzol, and water; melts in hot water; yellow by nitric acid; blue by sulphuric acid containing a trace of nitric acid or ferric salt; methylmorphine, having the same composition, differs somewhat from codeia.

Pseudomorphine (phormine), $C_{17}H_{19}NO_4$, 0.2 per cent. Insoluble in ether and chloroform; red by nitric acid, and blue by ferric chloride.

Thebaine (paramorphine), $C_{19}H_{21}NO_3$, 0.15 to 1 per cent. Soluble in ether and chloroform; red and yellow by sulphuric acid; yellow by nitric acid.

Narceine, $C_{23}H_{29}NO_9$, 0.02 to 0.1 or 0.7 per cent. Insoluble in ether; transiently yellow by nitric acid; blue by a little iodine.

Papaverine, $C_{21}H_{21}NO_4$, 1 per cent. Soluble in chloroform and benzol; slightly soluble in ether; violet-blue by sulphuric acid, changing to green with a nitrate.

Rhœadine, $C_{21}H_{21}NO_6$. Nearly insoluble in simple solvents; solutions in dilute acids tasteless and colorless, turning purple by sulphuric acid.

Cryptopine, $C_{21}H_{23}NO_5$. Sparingly soluble in most simple solvents; salts gelatinizing from hot water; blue by sulphuric acid, changing to orange-yellow by a nitrate.

Gnoscopine, $C_{34}H_{36}N_2O_{11}$. Soluble in chloroform; carmine-red by sulphuric containing nitric acid.

Oxynarcotine, $C_{22}H_{23}NO_5$. Soluble in alkalies.

Lanthopine, $C_{23}H_{25}NO_4$. Readily soluble in chloroform; orange-red by nitric acid; pale violet color by sulphuric acid, dark brown on heating.

Meconidine, $C_{21}H_{23}NO_4$. Readily soluble in ether, benzol, and chloroform; olive-green by sulphuric acid; orange-red by nitric acid.

Laudanine, $C_{20}H_{25}NO_4$. Sparingly soluble in ether; rose-red by sulphuric acid, violet on heating; orange-red by nitric acid; green with ferric chloride.

Codamine. $C_{20}H_{25}NO_4$. Readily soluble in simple solvents; blue with sulphuric acid, on heating, green and dark violet; green by nitric acid.

Deuteropine, $C_{20}H_{21}NO_5$. Not known in pure state.

Laudanosine, $C_{21}H_{27}NO_4$. Soluble in ether; melts at 89° C. (192.2° F.).

Protopine, $C_{20}H_{19}NO_5$. Slightly soluble in ether.

Hydrocotarnine, $C_{12}H_{15}NO_3$. Soluble in ether; melts at 50° C. (122° F.).

The last twelve alkaloids are present only in minute quantity.

Properties.—Narcotic, sedative, anodyne, antispasmodic, hypnotic, chiefly due to the morphine present. Narcotine is antiperiodic and tetanizing. Codeine is hypnotic, used in diabetes. Thebaine is soporific, excitant, and convulsifying. Narceine is feebly hypnotic. Papaverine is hypnotic and sedative. Cryptopine is hypnotic. *Dose*, Opium 0.06 to 0.13 gram (gr. j–ij) or more. Morphine 0.01 to 0.03 gram (gr. $\frac{1}{6}$–ss) or more.

LACTUCARIUM.—LACTUCARIUM.

Origin.—Lactuca virosa, *Linné*, L. sativa, *Linné*, and L. Scariola, *Linné*. *Natural order*, Compositæ, Ligulifloræ.

Habitat.—Southern and Central Europe; cultivated. (L. sativa is the garden lettuce.)

Preparation.—The top of the flowering stalk is cut off, and the milk-juice scraped into earthen vessels to harden.

Description.—In sections of plano-convex circular cakes, or in irregular angular pieces; externally gray-brown or dull reddish-brown; internally whitish or yellowish, of a waxy lustre; odor narcotic; taste bitter.

It is partly soluble in alcohol and ether, is softened by hot water, and, when triturated with water, yields a turbid mixture. Diluted alcohol dissolves between 36 and 44 per cent. of the lactucarium.

Lactuca canadensis, *Linné*, at the time of flowering, yields a good lactucarium; earlier in the season its milk-juice is not bitter.

Constituents.—Lactucin, $C_{11}H_{12}O_3.H_2O$ (bitter scales, soluble in 60 parts of cold water; turns red and brown by alkalies, and loses its bitter taste), lactucic acid (crystalline, bitter, red by alkalies), lactucopicrin (amorphous, bitter), lactucerin or lactucon about 50 per cent. (tasteless needles; composition variable), caoutchouc, resin, sugar, mucilage, asparagin, trace of volatile oil, ash 8 to 10 per cent., etc.

Properties.—Anodyne, hypnotic, sedative. *Dose*, 0.1 to 0.3 or 0.5 gram (gr. jss–v–viij), in syrup or fluid extract.

Thridace or French lactucarium is not the milk-juice, but the extract of the herb.

ALOE.—ALOES.

Origin.—1. Aloe socotrina, *Lamarck*. 2. A. vulgaris, *Lamarck*. 3. A. spicata, *Thunberg*, and other species of Aloe. *Natural order*, Liliaceæ.

Habitat.—1. Eastern Africa (Aloe Perryi, *Baker*, in the island of Socotra). 2. India and Northeastern Africa; naturalized in the West Indies. 3. Southern Africa, where 6 or 8 additional species are used in the preparation of aloes.

Preparation.—The leaves are cut off and the juice exuding from them is collected without using any pressure, after which it is evaporated.

Description.—Of different shades of brown, opaque, and in thin layers translucent or transparent; fracture somewhat conchoidal, dull waxy or glossy resinous; odor peculiar, when breathed upon saffron-like; taste bitter, nauseous. Aloes is almost completely soluble in alcohol, in boiling water, and in alkalies.

Varieties.—Aloe socotrina; Socotrine aloes. Hard, or the interior occasionally soft, opaque, yellowish-brown or orange-brown, not greenish, translucent; odor rather pleasant. Mixed with alcohol, and examined under the microscope, it exhibits numerous crystals. It is exported from Zanzibar and other places of Eastern Africa, frequently *via* Bombay.

Aloe barbadense; Barbadoes aloes. Deep orange-brown, opaque, translucent; odor differing somewhat from that of the preceding; under the microscope crystalline. It is exported from the island of Barbadoes. Bonare and Curaçao aloes, also derived from Aloe vulgaris, are more glossy.

Aloe capensis; Cape aloes. Blackish-brown or olive-black, transparent and red-brown on the edges, glossy; odor unpleasant; not crystalline under the microscope.

Natal aloes. Light yellowish-gray-brown, dull, and opaque; odor and taste weaker than in the other varieties; crystalline under the microscope; medicinally of little value. The plant yielding it is unknown; it is exported from Port Natal.

Moka aloes. Brown-black, opaque impure, and of disagreeable odor; from the interior of Arabia.

Caballine aloes; Horse aloes. Dark colored, opaque, and fetid.

Constituents.—Volatile oil a minute quantity, ash about 1 per cent., aloin and so-called resin. The latter amounts to about 60 per cent., is soluble in hot water, and almost wholly reprecipitated on boiling; soluble in alcohol and colored brown-black by ferric salts. The crystalline aloin is yellow or pale yellow, and not freely soluble in simple solvents. Cape aloes does not yield aloin.

Socaloin, $C_{15}H_{16}O_7$, is little affected by cold nitric acid.

Nataloin, $C_{16}H_{18}O_7$, is colored crimson by cold nitric acid. If added to cold sulphuric acid, and the vapor of nitric acid passed over it, the orange color will rapidly change to green, red, and blue; the other aloins are little affected by this test.

Barbaloin, $C_{17}H_{20}O_7$, is colored crimson by cold nitric acid.

Properties.—Laxative, drastic, emmenagogue, vermifuge. *Dose*, 0.12 to 0.3 or 0.5 to 1 gram (gr. ij–v or viij–xv), in pills, tincture, wine, enema, or suppository.

CURARA.—Curare.

Origin.—Strychnos Castelnæana, *Weddell*, Str. toxifera, *Schomburgk*, and other species of Strychnos. *Natural order*, Loganiaceæ.

Habitat.—Brazil and Guiana.

Preparation.—An infusion or decoction is made from the bark with the addition of various other substances; afterward evaporated.

Description.—Blackish-brown, extract-like, and hygroscopic, or firmer, brittle, and friable; about 75 per cent. soluble in cold water.

Constituents.—Curarine, $NC_{18}H_{35}$, resin, fat, gum, inorganic matters. Curarine is crystalline, hygroscopic, sparingly soluble in ether and chloroform, and is colored dark red by nitric acid; sulphuric acid colors carmine-red, becoming violet with potassium chromate.

Properties.—Diaphoretic, nervous sedative, irritant. *Dose*, 0.006 to 0.02 gram (gr. $\frac{1}{10}$–$\frac{1}{3}$).

EXTRACTUM GLYCYRRHIZÆ.—Liquorice. Licorice.

Succus liquiritiæ.

Origin.—Glycyrrhiza glabra, *Linné*. *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—Southern Europe; cultivated.

Preparation.—The bruised root is boiled with water, expressed, the liquid evaporated, and the stiff extract while warm rolled out into sticks.

Description.—Cylindrical brown-black sticks of varying dimensions, somewhat flexible when warm, breaking with a glossy and flat conchoidal fracture, and yielding a brown powder; odor slight; taste sweet, somewhat acrid.

Licorice loses on drying from 10 to 15 per cent. of moisture, and, if now treated with cold water, yields to it from 60 to 70 per cent. of its weight, and subsequently an additional quantity to dilute ammonia.

Constituents.—Glycyrrhizin, free and combined with bases, the former soluble in ammonia; glucose, starch, fragments of tissue, ash 6 to 8 per cent.

Adulterations.—Dextrin and gum are precipitated from the aqueous infusion by alcohol; glucose is not precipitated.

Properties.—Demulcent, expectorant. *Dose*, 1 or 2 grams (gr. xv–xxx); used for correcting the taste of bitter medicines.

CATECHU.—CATECHU. CUTCH.

Origin.—Acacia Catechu, *Willdenow*, and Ac. Suma, *Kurz*. *Natural order*, Luguminosæ, Mimoseæ.

Habitat.—India; the second species also in Eastern Africa.

Preparation.—The brown heartwood is boiled with water, and the concentrated decoction poured upon mats of leaves or into moulds.

Description.—In irregular masses, containing fragments of leaves, dark brown, glossy, brittle, breaking with a conchoidal fracture, often somewhat porous in the interior; nearly inodorous; taste strongly astringent and sweetish; soluble in alcohol and partly soluble in cold water.

Constituents.—Catechutannic acid, about 50 per cent. (brown, insoluble in ether, black-green with ferric salts), catechin (white needles, sparingly soluble in cold water, soluble in ether, sweetish, green with ferric salts), catechu red, little quercetin, ash 0.6 to 4.5 per cent. Catechin yields protocatechuic acid (Fe_2Cl_6 colors the solution dark green, changing by alkali carbonate to blue and red) and catechol (Fe_2Cl_6 colors dark green, changing by ammonia, etc., to violet).

Properties.—Tonic, astringent. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, pills, troches, or tincture.

CATECHU PALLIDUM.—GAMBIR.

Origin.—Uncaria (Nauclea, *Hunter*) Gambir, *Roxburgh.* *Natural order*, Rubiaceæ, Cinchoneæ.

Habitat.—East India Islands.

Preparation.—The leaves and young shoots are boiled in water and the decoction is evaporated.

Description.—Irregular masses or cubes about 25 millimeters (1 inch) square; externally dull brown, internally pale gray-brown, under the microscope crystalline, friable, inodorous, astringent, and sweetish; slightly soluble in cold water.

Constituents.—Catechin, little catechutannin.

Properties.—Tonic, astringent. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, pills, troches, or tincture.

KINO.—KINO.

Origin.—Pterocarpus Marsupium, *Roxburgh.* *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—East Indies.

Preparation.—Incisions are made into the trunk of the tree and the exuding red juice is inspissated without the use of artificial heat.

Description.—Small, angular, dark brown-red, shining pieces, brittle, in thin layers ruby-red and transparent; inodorous, very astringent, and sweetish; when masticated, becomes adhesive to the teeth and tinges the saliva deep red; soluble in alcohol and in alkalies, partly soluble in water, nearly insoluble in ether.

Constituents.—Kinotannic acid (black-green by ferric salts; in neutral solution violet by ferrous salts); kino-red (tasteless), pyrocatechin or catechol (a trace, soluble in ether and water), kinoin (slightly soluble in ether and cold water; by ferric chloride red), ash 1.3 per cent.

Varieties.—Malabar kino, described above.

Bengal or Palas kino, from Butea frondosa, *Roxburgh*, Leguminosæ. Blackish-red, in transparent light ruby-red tears or fragments, often with impressions of leaf-veins, brittle, not adhesive on mastication.

Gambia kino, from Pterocarpus erinaceus, *Poiret*, is now not an article of commerce.

Australian or Botany Bay kino, from different species of Eucalyptus, Myrtaceæ; varying in solubility and composition; some varieties contain much gum.

West Indian kino, from Coccoloba uvifera, *Linné*, Polygonaceæ. Dark brown-red, almost wholly soluble in water and alcohol; taste astringent and bitterish.

Properties.—Tonic, astringent. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder, pills, troches, or tincture.

MONESIA.—MONESIA.

Origin. — Chrysophyllum glyciphlœum, *Casaretti.* *Natural order*, Sapotaceæ.

Habitat.—Brazil.

Preparation.—Probably by boiling the bark in water and evaporating.

Description.—Black-brown cakes or angular fragments, soluble in water, inodorous; taste sweet, astringent, and acrid.

Constituents.—Tannin 52 per cent. (blue-black by ferric salts); sweet principle (resembling glycyrrhizin, but not precipitated by acids), monesin (resembling saponin, acrid, foaming in aqueous solution), pectin, coloring matter, ash 3 per cent.

Properties.—Stimulant, tonic, astringent. *Dose*, 0.3 to 1.5 gram (gr. v–xxij), in powder, tincture, and syrup.

Substitutions.—The astringent extracts described above have been sold in place of it; also

Extractum Hæmatoxyli, extract of logwood, which is red-brown, not acrid, and yields with water a red solution.

GUTTA PERCHA.—Gutta Percha.

Origin.—Dichopsis (Isonandra, *Hooker*) Gutta, *Bentham et Hooker*. *Natural order*, Sapotaceæ.

Habitat.—Malay peninsula and islands.

Collection.—The trees are felled, the bark is incised or strips of it are removed, and the milky juice collected and allowed to harden, or coagulated by boiling it with water.

Properties.—Grayish or yellowish masses, often with red-brown streaks, hard, rather horny, somewhat flexible, but scarcely elastic; spec. grav. about 0.98; elastic above 60° C. (140° F.), very soft at the temperature of boiling water; decomposed on melting; nearly inodorous and tasteless; insoluble in water and cold alcohol; soluble in benzol, chloroform, oil of turpentine, and carbon disulphide.

Balata, chicle or tuno gum from Sapota Muelleri, *Blume*, the Central America bully tree, closely resembles gutta percha in appearance and properties.

Constituents.—A hydrocarbon, $C_{20}H_{32}$ (white fine powder), a yellow resin, $C_{20}H_{32}O$, and a white crystalline resin, $C_{20}H_{32}O_2$; the last two separate on cooling from hot alcohol.

Uses.—As an adhesive and protective agent for wounds and abrasions, and for the preparation of bougies, pessaries, and caustic pencils.

ELASTICA. RESINA ELASTICA.—CAOUTCHOUC, INDIA RUBBER.

Origin.—In the milk juices of many plants; prepared chiefly from trees of the natural order of Euphorbiaceæ (Siphonia, Hevea, Jatropha, etc.), Apocynaceæ (Urceola, Vahea, Alstonia, etc.), and Artocarpaceæ (Ficus, Castilloa, etc.); these grow in tropical countries.

Preparation.—Incisions are made, and the milk-juice is allowed to congeal in mass, or it is dried over clay or wooden moulds with or without the aid of artificial heat.

Description.—In cakes, balls, or hollow bottle-shaped pieces, externally blackish-brown, internally brownish; spec. grav. about 0.96; very elastic; odor slight peculiar, nearly tasteless; soluble in carbon disulphide, chloroform, and oil of turpentine. It melts at about 125° C. (257° F.), and, after cooling, remains soft and adhesive; on dry distillation it yields caoutchoucin, containing caoutchin, $C_{10}H_{16}$, and isoprene, C_5H_3.

Constituents.—A hydrocarbon, $C_{20}H_{32}$. On combining it with about 10 per cent. of sulphur, vulcanized rubber is obtained; and on incorporating half its weight of sulphur and hardening by pressure, vulcanite or ebonite is produced.

Uses.—For plasters, bougies, pessaries, syringes, etc.

2. SUGARS.—SACCHARA.

Sugars have a sweet taste, are soluble in water and diluted alcohol, and insoluble in ether.

Classification.

Sect. 1. Solid sugars.	
Crystalline; not fermentable; does not reduce cupric oxide.	Saccharum.
Fermentable; reduces cupric to cuprous oxide; contains dextrin.	Saccharum uveum.
contains mucilage and mannit.	Manna.
White, gritty, not forming a syrup.	Saccharum lactis.
Sect. 2. Liquid sugars.	
Brown, somewhat empyreumatic.	Syrupus fuscus.
Brownish, aromatic; gradually becomes granular.	Mel.

SACCHARUM.—SAGAR. CANE SUGAR.

Origin.—Saccharum officinarum, *Linné. Natural order*, Graminaceæ.

Habitat.—Southern Asia; cultivated in tropical and subtropical countries.

Preparation.—Sugar cane yields by expression about 80 per cent. of juice, containing about 80 per cent. of water and 18 per cent. of sugar. The juice is evaporated, the residue granulated, the treacle or molasses drained off, and the raw sugar refined by dissolving in water, heating with blood, skimming, filtering through animal charcoal, and concentrating in a vacuum pan, until, after cooling, it congeals to a crystalline mass, from which the mother-liquor is washed out by percolation with water or sugar solution. Sugar is also prepared from the sugar-beet, which contains about 12 per cent. of it.

Description.—White crystalline pieces or transparent granules, of spec. grav. 1.58, not hygroscopic, inodorous, very sweet; fusible at 160° C. (320° F.); soluble in half its weight of cold water, forming a colorless syrup; sparingly soluble in strong alcohol; insoluble in ether. In contact with ferments suspended in the air, its aqueous solution is slowly converted into glucose, is then directly fermentable, and reduces red cuprous oxide from an alkaline solution of cupric oxide.

Composition.—$C_{12}H_{22}O_{11}$.

Adulterations.—Inferior sugars are whitened with ultramarine or Prussian blue, or are mixed with granular starch sugar.

Derivatives.—Saccharum crystallisatum, rock candy, is cane sugar in large crystals.

Saccharum hordeatum, barley sugar, is cane sugar carefully melted and cooled; it is amorphous, transparent, and gradually becomes crystalline and opaque upon the surface.

Caramel, $C_{12}H_{18}O_9$. Cane sugar is heated to about 200° C. (392° F.), the conversion is hastened by alkalies. Dark brown, used for coloring liquors.

Properties.—Demulcent, lenitive; externally in certain ulcerations.

SACCHARUM UVEUM.—GRAPE SUGAR.

Saccharum amylaceum. Starch sugar. Glucose.

Origin and Preparation.—Starch is boiled for a considerable time with dilute sulphuric acid, the free acid removed by calcium carbonate, and the filtered solution evaporated.

Description.—Whitish or yellowish masses or irregular granules, crystallizes with and without water, inodorous, sweet (less so than cane sugar), soluble in about one part of cold water, but in all proportions in hot water; sparingly soluble in strong alcohol, insoluble in ether; melts near 85° C. (185° F.). Its cold aqueous solution, mixed with twice its bulk of alcohol, yields a whitish precipitate if dextrin is present, and a white precipitate with ammonium oxalate from the presence of calcium sulphate. Commercial liquid grape sugar is called glucose, and contains much dextrin. The dilute solution in water is readily fermentable, is colored brown when heated with potassa, speedily reduces red cuprous oxide from an alkaline solution of cupric oxide, and separates a metallic mirror from an ammoniacal solution of silver.

Composition.—$C_6H_{12}O_6.H_2O$; on heating it caramel is obtained.

Properties.—Similar to cane sugar.

MANNA.—MANNA.

Origin.—Fraxinus Ornus, *Linné*, s. Ornus europæa, *Persoon.* *Natural order*, Oleaceæ.

Habitat.—Basin of the Mediterranean.

Collection.—In Sicily transverse incisions are made through the bark, and the exuding juice is allowed to harden on the trunk of the tree or on tiles.

Description.—Flattish three-edged pieces, occasionally 20 centimeters (8 inches) long and 5 centimeters (2 inches broad, usually smaller, friable, externally yellowish-white, internally white, porous, and crystalline. Or in fragments of different size, brownish-white, and somewhat glutinous on the surface, internally white and crystalline; odor honey-like; taste sweet, slightly bitter, and faintly acrid.

Manna consisting of brownish viscid masses containing few or no fragments having a crystalline structure, should be rejected.

Varieties.—Large flake manna; the larger yellowish-white pieces.

Small flake manna; smaller pieces, occasionally of a brownish hue.

Manna in sorts; minute tears or small glutinous fragments, internally crystalline.

Fat manna; brownish viscid masses, without crystalline fragments.

Constituents.—Mannit, $C_6H_{14}O_6$, 90 per cent. in the best varieties, glucose, mucilage, resin, fraxin, $C_{32}H_{36}O_{20}$. Mannit crystallizes in white prisms, dissolves in 6.5 parts of cold water, and sparingly in strong alcohol. The amount of glucose is largest in the inferior kinds of manna, which also contain a larger portion of fraxin, to which the fluorescence of the aqueous solution is due.

The mannas of Briançon from Larix europæa, *De Candolle*, of Armenia from Quercus vallonea, *Kotschy*, of Persia from Alhagi camelorum, *Fischer*, and others are not met with in commerce.

Properties.—Demulcent, laxative. *Dose*, 4 to 32 grams (ʒj–℥j), in solution, syrup, or as addition to other medicines.

SACCHARUM LACTIS.—MILK SUGAR.

Origin.—The milk of mammals.

Preparation.—After the removal of the butter and casein from cows' milk, the whey is concentrated and allowed to crystallize upon sticks or cords.

Description. — Hard white translucent four-sided prisms, usually aggregated into cylindrical masses, becomes anhydrous at 130° C. (266° F.), and melts at 203.5° C. (398° F.); soluble in 6 parts of cold water without forming a syrupy solution, insoluble in strong alcohol and in ether; inodorous; of a sandy and sweetish taste.

The solution in water boiled with potassa turns yellowish-brown, slowly reduces cuprous oxide from alkaline solutions of cupric oxide, and deposits a metallic mirror from an ammoniacal solution of silver.

Composition.—$C_{12}H_{22}O_{11}.H_2O$; on heating it caramel is obtained.

Properties.—Demulcent, laxative; chiefly used as a vehicle.

SYRUPUS FUSCUS.—MOLASSES.

Sacchari fæx, Theriaca, Treacle.

Origin.—Obtained in the manufacture and refining of sugar.

Description.—Syrupy liquid of various shades of brown, clear or nearly clear, spec. grav. about 1.40; reaction slightly acid; odor slightly empyreumatic; taste very sweet; is not precipitated by an equal bulk of alcohol.

Varieties.—West India and sugar-house molasses; the former has a lighter color and somewhat different odor.

Properties.—Like sugar.

MEL.—HONEY.

Origin and Preparation.—Honey is deposited in the honeycomb by the bee, Apis mellifica, *Linné. Class,* Insecta. *Order,* Hymenoptera. It is obtained either by draining or by melting the honeycomb.

Description.—Syrupy, light yellowish or pale brownish-yellow, translucent, gradually becoming crystalline and opaque, of a slight acid reaction, agreeable aromatic odor, and sweet, faintly acrid taste.

Boiled with water and allowed to cool, it does not become blue on the addition of compound solution of iodine; and when diluted with one part of water, and the solution mixed with an equal bulk of alcohol, no precipitate, or but a very slight one, is produced.

Constituents.—Grape sugar or dextrose (becomes crystalline), fruit sugar or levulose (remains liquid), little wax, volatile oil, coloring matter, mucilage, and a minute quantity of formic acid; ash 0.1 to 0.3 per cent.

Properties.—Demulcent, laxative; externally as a mild stimulant.

3. GUMS.—GUMMATA.

Gums have an insipid taste, are insoluble in alcohol and ether, but dissolve in water, forming a mucilaginous liquid, or form with water a jelly-like adhesive mass.

Classification.

Soluble in water; distinct tears, transparent, but fissured internally.	Acacia.
Swelling in water; curved bands, translucent, composed of several layers.	Tragacantha.

ACACIA.—Gum Arabic.

Origin.—Acacia Verek, *Guillemin et Perottet*, s. A. Senegal, *Willdenow*, and other species of Acacia. *Natural order*, Leguminosæ, Mimoseæ.

Habitat.—Eastern Africa, principally Kordofan; Western Africa near the river Senegal.

Production.—The gum exudes spontaneously and from incisions made into the bark.

Description.—Roundish brittle tears of various sizes, or broken into angular fragments, with a glass-like, sometimes iridescent fracture, opaque from numerous fissures, but transparent and nearly colorless in thin pieces; nearly inodorous; taste insipid, mucilaginous; insoluble in alcohol; soluble in water, forming a thick mucilaginous liquid. This solution has an acid reaction to test-paper, yields gelatinous precipitates with subacetate of lead, ferric chloride, and concentrated solution of borax, and is not colored blue by iodine.

Varieties.—Kordofan gum, the best kind, described above.

Senaar gum, nearly equal to the preceding.

Savakin (Suakin) gum, of handsome appearance, very brittle; does not completely dissolve in water except after the addition of a little alkali.

East India gum is mostly produced from Eastern Africa, and shipped by way of Bombay.

Senegal gum. The tears are often larger, color more yellow or reddish; fissures fewer in number, therefore more transparent and less brittle; taste sometimes bitterish.

Mezquite gum from Algarobia glandulosa, *Torrey et Gray*, in Western Texas and Mexico; resembles gum Arabic, but is mostly yellow or red-brown; its solution in water is not precipitated by subacetate of lead, ferric chloride, or borax.

Considerable gum is also produced from different species of Acacia in Morocco, the Cape Colony, and Australia.

Composition.—Arabic acid, $C_{12}H_{22}O_{11}$, combined with calcium, magnesium, and potassium; ash 3 to 4 per cent. Arabic or gummic acid, after drying, swells with water, but does not dissolve in it, except after the addition of an alkali (Savakin gum).

Properties.—Demulcent.

TRAGACANTHA.—TRAGACANTH.

Origin.—Astragalus gummifer, *Labillardière*, and other species of Astragalus. *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—Western Asia.

Production.—The tissue of the pith and medullary rays is gradually altered to a compound swelling with water, and in this condition exuding spontaneously and from incisions into the stem of the shrubs.

Description.—Narrow or broad bands, more or less curved or contorted, marked by parallel lines or ridges; white or faintly yellowish, translucent, horn-like, tough, rendered more pulverizable by a heat of 50° C. (122° F.); inodorous; taste insipid, sometimes faintly bitterish. It swells with water into a gelatinous mass which is tinged blue by iodine, and the fluid portion of which is precipitated by alcohol and lead acetate, but not disturbed by ferric chloride and borax.

Varieties.—Flake tragacanth, the bands described above.

Vermiform tragacanth; very narrow bands or strings, variously coiled.

Tragacanth in sorts. Stratified or nodular, conical, and subglobular pieces, more or less brown, often adulterated with the gum of the almond and plum trees.

Constituents.—Traganthin, $C_{12}H_{20}O_{10}$, and the calcium compound of a gummic acid, not identical with Arabic acid; starch, fragments of cells, ash 3 per cent.

Properties.—Demulcent.

4. GUM-RESINS.—GUMMI-RESINÆ.

Gum resins are milky exudations of plants, and consist of gum which is wholly or partly soluble in water, and resin which is soluble in alcohol. Many gum resins contain also volatile oil. Fragments of vegetable tissue, small fruits, or seeds are occasionally met with in the commercial gum resins, all of which yield emulsions on being triturated with water.

Classification.

Sect. 1. Gum resins containing volatile oil.	
Tears internally white, turning red on exposure, imbedded in a brown sticky mass.	Asafœtida.
Tears small, internally whitish, superficially adhesive; occasionally brownish, semifluid.	Galbanum.
Tears few, imbedded in a brown sticky mass; emulsion brown; odor garlic-like.	Sagapenum.
Tears brownish, internally milk-white, distinct, or superficially adhering.	Ammoniacum.
Tears or masses, dull reddish-brown.	Opopanax.
Tears yellowish, translucent.	Olibanum.
Tears or masses, reddish-brown, translucent; fracture waxy.	Myrrha.
Resembling myrrh; but tincture not colored purple by nitric acid.	Bdellium.
Sect. 2. Gum resins free from volatile oil.	
Pipes or cakes; bright orange-yellow.	Cambogia.
Tears, frequently hollow; light brown-yellow.	Euphorbium.
Cakes greenish-black or grayish; internally porous; odor cheese-like.	Scammonium.

ASAFŒTIDA.—ASAFETIDA.

Origin.—1. Ferula Narthex, *Boissier* (Narthex Asafœtida, *Falconer*). 2. Ferula Scorodosma *Bentham et Hooker* (Scorodosma fœtidum, *Bunge*). *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—1. Western Thibet and probably Kashmir. 2. Persia, Turkestan, and Afghanistan.

Collection.—The top of the large root is laid bare, thin slices are cut off, and the exuding milk-juice is scraped off.

Description.—In irregular masses composed of whitish tears, imbedded in a yellowish-gray or brown-gray sticky mass. The tears when hard break with a milk-white conchoidal fracture, turning gradually to a pink and finally to a brown color. The sticky mass always contains vegetable fragments and earthy impurities (calcium sulphate, etc.). The odor is alliaceous; the taste bitter, acrid, and alliaceous. It is partly soluble in ether and in alcohol, and yields with water a milk-white emulsion. Good asafetida yields to alcohol 60 per cent. of soluble matter. Moistened with alcohol, asafetida acquires a greenish color on the addition of hydrochloric acid.

Varieties.—Liquid asafetida; white, opaque, syrupy, or semifluid mass, gradually turning brown.

Asafetida in tears; tears of various sizes, distinct or adhesive and agglutinated.

Amygdaloid asafetida; the kind described above.

Stony asafetida; consists of gypsum and other earthy matters, agglutinated with the milk-juice; unsuited for medicinal purposes.

Constituents.—Aside from the impurities asafetida contains 3 to 6 or 9 per cent. of volatile oil (sulphurets of ferulyl, C_6H_{11}, odor strongly alliaceous), 20 to 30 per cent., sometimes more of gum (partly soluble in water, mostly soluble in alkalies), and 50 to 70 per cent. of resin, of which a small portion (3 to 4 per cent.) is insoluble in ether, and which contains a little ferulaic acid, $C_{10}H_{10}O_4$. The earthy additions consist of calcium sulphate, calcium carbonate, and sand, occasionally to the amount of 40 per cent. On dry distillation the resin yields umbelliferon, and fused with potassa gives resorcin.

Properties.—Stimulant, expectorant, laxative, antispasmodic. *Dose*, 0.3 to 1.5 gram (gr. v–xxij), in pills, emulsion, or tincture.

GALBANUM.—GALBANUM.

Origin.—Ferula galbaniflua, *Boissier et Buhse*, and other species of Ferula. *Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Persia.

Production.—Galbanum exudes spontaneously, chiefly from the lower part of the stem.

Description.—In tears, from the size of a pin's head to that of a pea, or larger, mostly agglutinated, forming a more or less hard mass; externally pale brownish, with a yellow or green tint, internally milk-white or yellowish, with a waxy lustre; odor peculiar, balsamic; taste bitter and acrid; partly soluble in ether and alcohol; yields with water a milk-white emulsion. When moistened with alcohol, it acquires a purple color on the addition of a little hydrochloric acid.

Varieties.—Galbanum in tears, the kind described above.

Lump galbanum; soft or hard masses, of a more or less brown color, inclosing tears or free from the same; it differs more or less in odor from the preceding and is often not colored by alcohol and hydrochloric acid. It may, in part, be derived from Ferula rubricaulis, *Boissier*.

Constituents.—Volatile oil 6 to 9 per cent., $C_{10}H_{16}$, resin 60 to 66 per cent. (soluble in ether, alcohol, carbon disulphide, and alkalies; yields on dry distillation a blue volatile oil and umbelliferon; fused with HKO, resorcin is obtained), gum 15 to 20 per cent., umbelliferon, $C_9H_6O_3$ (soluble in alcohol and ether, sparingly soluble in cold water, the latter solution blue fluorescent with ammonia).

Properties.—Stimulant, expectorant, antispasmodic. *Dose*, 0.3 to 2 grams (gr. v–xxx), in pills or emulsion, externally in plasters.

Allied Gum Resin.—Sagapenum; probably obtained from a species of Ferula; yellowish-brown or brown, amygdaloid or free from tears; blue by hydrochloric acid; contains umbelliferon, the volatile oil free from sulphur.

AMMONIACUM.—AMMONIAC.

Origin.—Dorema Ammoniacum, *Don. Natural order*, Umbelliferæ, Orthospermæ.

Habitat.—Eastern Persia and Turkestan.

Production.—Ammoniac exudes spontaneously from the stem.

Description.—Globular or irregular roundish, often somewhat flattened tears, either distinct or agglutinated, pale brownish-yellow externally, and breaking with a conchoidal waxy milk-white fracture. It softens by the heat of the hand, yields a white emulsion when triturated with water, and has a peculiar somewhat balsamic odor, and a bitter acrid and nauseous taste. When moistened with alcohol, it is not colored on the addition of hydrochloric acid.

Cake ammoniac having the tears imbedded in a brown resinous mass should not be employed internally.

Constituents.—Volatile oil ½ to 4 per cent. (free from sulphur), resin 70 per cent. (an acid and an indifferent resin; does not yield umbelliferon), gum 18 to 22 or 28 per cent. (partly soluble in water, mostly soluble in alkalies). The resin fused with HKO, yields resorcin, $C_6H_6O_2$, which is soluble in simple solvents, volatile and inflammable, reddened on exposure and becomes purplish-black with ferric chloride.

Properties.—Stimulant, expectorant. *Dose*, 0.3 to 2 grams (gr. v–xxx), in pills and emulsion.

Allied Gum Resins.—African ammoniac from Ferula tingitana, *Linné*, in Northern Africa; darker colored than the preceding, of a rather more agreeable odor and acrid not bitter taste; yields umbelliferon.

Opopanax from Opopanax Chironium, *Koch*, of Southern Europe; dull reddish-brown masses or tears, friable, of waxy lustre; odor unpleasant; taste balsamic, bitter.

OLIBANUM.—FRANKINCENSE.

Origin.—Boswellia Carterii, *Birdwood*, and other species of Boswellia. *Natural order*, Burseraceæ, Bursereæ.

Habitat.—Eastern Africa and Arabia.

Production.—Frankincense exudes from incisions, made into the bark.

Description.—Roundish, oblong, or irregular tears, variable in size, externally dusty; fracture flattish, waxy, yellowish or pale reddish, translucent; odor balsamic terebinthinate; softened by mastication; taste balsamic, bitterish; partly soluble in alcohol; yields with water a milk-white emulsion.

Lump olibanum consists of irregular impure masses which have been gathered from the ground.

Constituents.—Volatile oil, 4 to 7 per cent. (olibene, $C_{10}H_{16}$, and oxygenated portion), resin 56 to 72 per cent., gum about 30 per cent. (resembles gum arabic), bitter principle (soluble in alcohol and water).

Properties.—Stimulant, expectorant. *Dose*, 1 to 3 grams (gr. xv–xlv), in emulsion, mostly used in plasters and for fumigations.

MYRRHA.—Myrrh.

Origin.—Balsamodendron Myrrha, *Nees*. *Natural order*, Burseraceæ, Bursereæ.

Habitat.—Eastern Africa and Southwestern Arabia.

Production.—Myrrh exudes spontaneously from the bark.

Description.—Roundish or irregular tears or masses, dusty, brown-yellow or reddish-brown; fracture waxy, somewhat splintery, translucent on the edges, sometimes marked with whitish veins; odor balsamic; on mastication adhesive; taste bitter and acrid. When triturated with water, myrrh yields a brown-yellow emulsion. Alcohol yields a brown-yellow tincture which acquires a purple hue on the addition of nitric acid. Dark-colored pieces the alcoholic solution of which is not rendered purple by nitric acid, and pieces of gum which dissolve completely or merely swell in water, and are but slightly soluble in alcohol, should be rejected.

Constituents.—Volatile oil 2 to 4 per cent. (oxygenated, easily resinifying), resin 25 to 40 per cent., gum 40 to 60 per cent. (precipitated by lead acetate), bitter principle (soluble in alcohol and water), ash 3 to 4 per cent.

Properties.—Stimulant, tonic, expectorant, emmenagogue, vulnerary. *Dose*, 0.3 to 2 grams (gr. v–ʒss), in pills and emulsion; externally in powder and tincture.

BDELLIUM.—Bdellium.

Origin.—1. Balsamodendron Mukul, *Hooker;* 2. B. africanum, *Arnott. Natural order*, Burseraceæ, Bursereæ.

Habitat.—1. East India; 2. Western Africa.

Description.—1. Globular or irregular pieces, externally dusty; fracture flat conchoidal, dark brown or blackish, translucent in thin fragments. 2. Irregular, globular, or oval tears, externally dusty; fracture angular, waxy, yellowish to brown-red, translucent. Odor and taste myrrh-like; the tincture is not colored red by nitric acid.

Constituents.—Volatile oil, resin, gum, bitter principle.

Properties and Uses.—Similar to myrrh, mostly used in plasters.

CAMBOGIA.—Gamboge.

Gutti. Gambogia.

Origin.—Garcinia Hanburii, *Hooker filius*, s. G. Morella, *Desrousseaux*, var. pedicellata, *Hanbury. Natural order*, Guttiferæ.

Habitat.—Anam, Camboja, and Siam.

Production.—The milk-juice exudes from incisions, and is collected in bamboo joints.

Description.—In cylindrical pieces, sometimes hollow in the centre, 25 to 50 millimeters (1 to 2 inches) in diameter, longitudinally striate on the surface; fracture flattish conchoidal, smooth, of a waxy lustre; orange-red or in powder bright yellow; inodorous; taste very acrid; the powder sternutatory. It is partly soluble in alcohol and ether; when triturated with water yields a yellow emulsion, and forms with solution of potassa an orange-red solution, from which, on the addition of hydrochloric acid, yellow resin is precipitated. Boiled with water, gamboge yields a liquid which after cooling does not become green with compound solution of iodine.

Varieties.—Pipe gamboge; the kind described above. Cake gamboge; in irregular lumps or cakes, dried in flat vessels; more liable to be adulterated.

Constituents.—Gum 16 to 20 per cent. (not precipitated by lead acetate or ferric chloride), resin or cambogic acid about 80 per cent. (soluble in alcohol and ether; colored black-brown by ferric chloride; soluble in alkalies with a red color).

Properties.—Hydragogue cathartic. *Dose*, 0.03 to 0.3 (gr. ss–v), in pills, in combination with other medicines.

EUPHORBIUM.—EUPHORBIUM.

Origin.—Euphorbia resinifera, *Berg.* *Natural order*, Euphorbiaceæ.

Habitat.—Morocco.

Production.—Euphorbium exudes from incisions made into the stem.

Description.—In conical or globular nodular pieces, often hollow or inclosing fragments of the spines or flowers, dull brownish-yellow, slightly translucent, brittle; nearly inodorous, the dust violently sternutatory; taste very acrid; partly soluble in alcohol and ether; triturated with water, a turbid mixture is obtained, but not a complete emulsion.

Constituents.—Gum 18 per cent. (precipitated by lead acetate), resin $C_{10}H_{16}O_2$, 38 per cent. (soluble in cold alcohol, very acrid), euphorbon $C_{13}H_{22}O$ (tasteless, crystalline, soluble in ether, chloroform, and boiling alcohol), malates 12 per cent., ash about 10 per cent

Properties.—Drastic purgative and emetic; sternutatory, rubefacient, vesicant, suppurant; only used externally.

SCAMMONIUM.—SCAMMONY.

Origin.—Convolvulus Scammonia, *Linné.* *Natural order*, Convolvulaceæ.

Habitat.—Western Asia.

Production.—The top of the root is laid bare, thin slices are cut off, and the milk-juice is collected in shells.

Description.—Irregular angular pieces or circular cakes, greenish-gray or blackish, internally porous and of a resinous lustre, breaking with an angular fracture; odor peculiar, somewhat cheese-like; taste slightly acrid; powder gray or greenish-gray. When triturated with water, scammony yields a greenish emulsion. It does not effervesce with acids, and the decoction, when cold, is not colored blue by iodine. Ether dissolves at least 80 per cent. of it, and when the residue left on evaporating the ether is treated with a hot solution of potassa, it yields a solution which is not precipitated by acids.

Constituents.—Resin 80 to 90 or 95 per cent., gum. The resin is scammonin, $C_{34}H_{56}O_{16}$, and is identical with jalapin of Ipomœa orizabensis; it is by alkalies converted into scammonic acid which is soluble in water.

Adulterations.—Calcium carbonate, starch, occasionally other resins.

Properties.—Hydragogue cathartic. *Dose*, 0.06 to 0.3 or 0.5 gram (gr. j–v–viij), in pills, powder, or emulsion, usually combined with other medicines.

5. RESINS.—RESINÆ.

Resins are solid, rarely crystalline, fusible, not volatile, combustible with a sooty flame, insoluble in water, but soluble in one or more of the following menstruums: alcohol, ether, chloroform, carbon disulphide, fixed oils, volatile oils, the fixed alkalies, carbonated alkalies, and ammonia. Those soluble in alkaline liquids (resin soaps) are called resin-acids.

Resins are excretions or secretions of plants, and are found either diffused in the other constituents, or separated in cells (heartwood of guaiacum), in ducts or upon the surface of plants. When exuding from plants, resins are probably dissolved in volatile oils.

The natural resins are usually mixtures of two or more resins; a few contain also benzoic or cinnamic acid; all are free from nitrogenated compounds. Those containing coloring matters may often be bleached by means of chlorine or by repeatedly precipitating them from their alcoholic solution with water.

Classification.

Sect 1. Resins free from benzoic and cinnamic acids.

Greenish or gray friable fragments; bitter, containing crystals.	Elaterium.
Tears yellowish, transparent; on mastication plastic.	Mastiche.
on mastication pulverulent.	Sandaraca.
Masses yellowish to brown, transparent, friable.	[illegible]
Masses roundish, yellowish, transparent, hard[illegible] than preceding.	[illegible]
Roundish or angular, often verrucose, yellowi[illegible] to brownish, hard.	[illegible]

Irregular, yellow to red-brown, hard and brittle; when heated, aromatic.	Succinum.
Brown-red sticks, or thin glossy brownish or brown fragments.	Lacca.
Tears or masses, greenish-brown, by tincture of ferric chloride blue or green.	Guaiaci resina.
Sect. 2. Resins containing benzoic or cinnamic acid.	
Sticks or cakes, brittle, dark brown-red, powder bright red.	Draconis resina.
Milk-white tears, imbedded in dull light brown or glossy reddish-brown mass.	Benzoinum.
Brittle pieces, externally brownish-yellow, internally yellow.	XanthorrhϾ resina.

ELATERIUM.—ELATERIUM.

Origin.—Ecballium (Momordica, *Linné*) Elaterium, *Richard.* *Natural order*, Cucurbitaceæ.

Habitat.—Western Asia and Southern Europe; cultivated.

Production.—The nearly ripe fruit is cut lengthwise, slightly pressed, the juice passed through a hair sieve and then set aside; the deposit is collected on calico and rapidly dried between bibulous paper or on porous tiles.

Description.—In light, friable, flattish fragments, pale green when fresh, afterward gray or light buff colored, with minute crystals on the surface; fracture granular; odor slight tea-like; taste acrid and very bitter. It does not effervesce with acid, and the decoction with water, after cooling, is not colored blue on the addition of a drop of compound solution of iodine. When 1 gram (16 grains) is exhausted with chloroform, and ether is added to the solution, a crystalline deposit of elaterin is obtained weighing not less than 25 centigrams (4 grains).

Constituents.—Elaterin 27 to 33 per cent., chlorophyll, ash 8 to 10 per cent., perhaps also prophetin (soluble in ether, brown-red with sulphuric acid, bitter), ecballin (soft, yellow, acrid, and bitter), hydroelaterin (soluble in water), and elaterid (bitter, insoluble in ether and water). Elaterin, $C_{20}H_{28}O_5$, is crystalline, fusible, readily soluble in chloroform and hot alcohol, sparingly soluble in ether, insoluble in water and petroleum benzin, very bitter in alcoholic solution, and is not colored by chlorinated alkalies and but slightly colored by cold sulphuric acid.

Adulterations.—Starch and calcium carbonate or other mineral substances are used for this purpose.

Properties.—Hydragogue cathartic. *Dose*, 0.008 to 0.016 gram (gr. $\frac{1}{8}$–$\frac{1}{4}$); elaterin, 0.004 to 0.005 gram (gr. $\frac{1}{16}$ to $\frac{1}{12}$), in pill or alcoholic solution.

MASTICHE.—Mastic, Mastich.

Origin.—Pistacia Lentiscus, *Linné*. *Natural order*, Anacardiaceæ.

Habitat.—Mediterranean basin.

Production.—Mastic exudes from vertical incisions into the bark of the staminate trees, and is collected in the island of Scio.

Description.—Globular or elongated tears, of the size of a pea, or larger, usually covered with a whitish dust, pale yellow, transparent, of a glass-like lustre, brittle, becoming plastic when masticated; odor weak, balsamic; taste slight terebinthinous; soluble in ether and volatile oils.

Bombay mastic from Pistacia cabulica and P. Khinjuk, *Stocks*, closely resembles Scio mastic, but is usually less clean and more opaque.

Constituents.—Volatile oil a trace, alpha resin or mastichic acid, $C_{20}H_{32}O_2$, 90 per cent. (soluble in alcohol), masticin (insoluble in alcohol).

Adulterations.—Sandarac, see below.

Properties.—Mild stimulant, mostly used as a masticatory, for filling decayed teeth, for cements and varnishes.

SANDARACA.—SANDARAC.

Origin.—Callitris quadrivalvis, *Ventenat.* *Natural order*, Coniferæ, Cupresseæ.

Habitat.—Northwestern Africa.

Production.—Sandarac exudes spontaneously or from incisions made through the bark.

Description.—Elongated, pale yellow tears, 6 to 15 millimeters ($\frac{1}{4}$—$\frac{3}{5}$ inch) long, covered with a whitish dust, of a glass-like lustre, transparent, brittle, becoming pulverulent when masticated; odor and taste somewhat terebinthinous, balsamic, and faintly bitter; soluble in hot alcohol.

Constituents.—Three resins, differing in solubility; bitter principle, soluble in water.

Properties.—Mild stimulant; used chiefly for varnishes.

COLOPHONIUM.—RESINA, ROSIN.

Origin.—Pinus australis, *Michaux*, and other species of Pinus. *Natural order*, Coniferæ, Abietineæ.

Habitat.—United States.

Production.—The volatile oil is distilled from turpentine; the residue constitutes colophony.

Description. — Transparent amber-colored masses, having a glossy and shallow conchoidal fracture, melting at about 100° C. (212° F.); odor and taste faintly terebinthinate; soluble in alcohol, ether, volatile oils, fixed oils, and alkalies.

Varieties.—Distinguished according to color.

Constituents.—Abietic anhydrid, $C_{44}H_{62}O_4$, in the presence of dilute alcohol converted into abietic acid.

Properties.—Mild stimulant; used in plasters and ointments.

DAMMARA.—DAMMAR.

Origin.—1. Dammara orientalis, *Lambert;* 2. Dammara australis, *Don. Natural order*, Coniferæ, Abietineæ.

Habitat.—1. East India islands; 2. New Zealand.

Production.—Dammar exudes spontaneously; the New Zealand dammar or kauri resin is also found fossil.

Description.—Transparent straw-colored roundish masses, having a glossy conchoidal fracture, melting above 100° C. (212° F.) to a thick liquid, harder than rosin, but softer than copal; nearly inodorous and tasteless; partly soluble in alcohol and benzin; more soluble in ether, chloroform, and benzol. Kauri resin softens somewhat between the teeth, and is often in large masses.

Constituents.—Several resins differing in solubility; dammaryl, $C_{20}H_{32}$, insoluble in boiling alcohol, soluble in cold ether. By distillation in a current of steam, a terpene, $C_{10}H_{16}$, of the boiling point 158° C. (316° F.) is obtained.

Uses.—Mostly for varnishes, and rarely in plasters.

COPAL.—COPAL.

Origin,—Fossil in Zanzibar and probably in Western tropical Africa; also the exudations of different species of Trachylobium, Hymenæa, and Guib [illegible] *order*, Leguminosæ, Cæsalpinieæ.

Habitat.—Africa, South America, [illegible]

Description.—Irregular spherical or flattish and angular, the surface often finely verrucose (goose skin), varying between pale yellowish, reddish, and brownish, spec. grav. 1.04, nearly as hard as amber, transparent or translucent, fracture conchoidal, glossy; inodorous and tasteless; melts with difficulty, acquiring a darker color; after fusion more readily soluble in alcohol and oil of turpentine.

Constituents.—Several resins, differing in solubility.

Uses.—For the preparation of varnishes.

SUCCINUM.—Amber.

Origin.—Fossil, from Pinitis succinifer, *Gœppert*, an extinct coniferous tree of the southern coast of the Baltic.

Description.—Roundish or flattish pieces, the surface usually rough and dull; hard and brittle; fracture conchoidal, glossy, transparent or translucent, pale yellowish to brown-red; inodorous but aromatic when heated; tasteless; spec. grav. 1.09; somewhat soluble in chloroform, nearly insoluble in alcohol, ether, and oils, melts at 287.5° C. (550° F.), giving off succinic acid; and at a higher heat also water, volatile acids, and empyreumatic oil.

Constituents.—Succinic acid, $C_4H_6O_4$, and several resins.

Uses.—For fumigations, and for the preparation of succinic acid and (empyreumatic) oil of amber; also used in the arts.

LACCA.—Lac.

[illegible]*rin.*—1. Aleurites laccifera, *Willdenow;* 2. Ficus [illegible] *Roxburgh*, and other trees. *Natural order*, 1. [illegible]aceæ; 2. Urticaceæ, Artocarpeæ.

Habitat.—East Indies.

Production.—By the puncture of the impregnated female Coccus Lacca, *Kerr*, *order* Hemiptera.

Description.—Stick lac. Thin branches, covered with a brown-red resin, containing a blackish-red powder; softens between the teeth and colors the saliva red; taste bitterish, slightly astringent; on being heated, of an aromatic odor.

Seed lac. Irregular, somewhat glossy fragments, detached from the twigs.

Lump lac. Made by boiling with water and melting. Brown translucent cakes, deprived of the purplish-red coloring matter.

Shellac. Thin, glossy, more or less transparent fragments, varying from amber-colored to dark brown; brittle, tasteless; soluble in the fixed alkalies and in borax solution; almost wholly soluble in cold alcohol, ether, and volatile oils.

Constituents.—Coloring matter (lac dye), five resins, waxy matter.

Uses.—For the preparation of varnish and sealing-wax.

GUAIACI RESINA.—Guaiac Resin.

Origin.—Guaiacum officinale, *Linné*. *Natural order*, Zygophyllaceæ.

Habitat.—West India Islands and Northern South America.

Production.—Guaiac resin exudes from incisions through the bark, but is mostly obtained by melting the resin of the heartwood with fire.

Description.—Irregular masses or subglobular pieces, greenish-brown or reddish-brown, internally of a glossy lustre, transparent in thin splinters, fusible, feebly aromatic, somewhat acrid; powder grayish, turning green on exposure; soluble in solution of potassa and in alcohol; the alcoholic solution colored blue on the addition of tincture of chloride of iron.

Constituents.—Guaiacic acid and guaiac yellow (both crystalline, dissolved by milk of lime), guaiaretic acid, $C_{20}H_{26}O_4$, about 10 per cent. (crystalline, not colored blue by nitric acid), guaiaconic acid, $C_{19}H_{20}O_5$, about 70 per cent. (amorphous, colored blue by oxidizing agents), beta-resin about 10 per cent. (insoluble in ether), little gum and ash. By dry distillation are obtained guaiacene, C_5H_8O (odor of bitter almond), guaiacol, $C_7H_8O_2$ (colorless aromatic oil), creosol, $C_8H_{10}O_2$ (resembling guaiacol), and pyroguaiacin, $C_{19}H_{22}O_3$ (inodorous scales, colored green by ferric chloride and blue by warm sulphuric acid).

Properties.—Stimulant, diaphoretic, alterative. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in pills, mixture, or tincture.

DRACONIS RESINA.—Dragon's Blood.

Sanguis draconis.

Origin.—Calamus (Dæmonorops, *Martius*) Draco, *Willdenow*. *Natural order*, Palmaceæ.

Habitat.—Borneo, Sumatra, and adjacent islands.

Production.—Dragon's blood exudes spontaneously from the fruit while ripening, is separated by beating, softened by heat, and moulded.

Description.—In tear-like grains; in globular pieces about 35 millimeters (1⅖ inch) in diameter; in cylindrical sticks about 30 centimeters (12 inches) long and 15 millimeters (⅗ inch) thick, or in irregular cakes; externally dark brown-red; internally brighter red, transparent in thin splinters; brittle; fracture irregular and rather dull; inodorous—when heated aromatic, resembling benzoin; nearly tasteless; soluble (except the impurities) in alcohol, chloroform, benzol, and alkalies.

Constituents.—Red resin (by nitric acid converted into benzoic, nitrobenzoic, oxalic, and a little picric acid), waxy matter, benzoic acid 3 per cent., the latter obtainable by dry distillation. In place of the latter, cinnamic acid appears to be sometimes present, or both acids may be wanting.

Properties.—Mild stimulant and astringent; used for plasters, tooth-powders, and varnishes.

BENZOINUM.—BENZOIN.

Origin.—Styrax Benzoin, *Dryander*. *Natural order*, Styraceæ.

Habitat.—Sumatra, Java, probably also Siam.

Production.—Benzoin exudes from incisions made into the bark of the tree.

Description.—In lumps consisting of agglutinated yellowish-brown tears, which are internally milk-white, or of a brown mass more or less mottled from whitish tears imbedded in it. It has a somewhat aromatic and acrid taste and an agreeable balsamic odor, gives off when heated fumes of benzoic acid, and is soluble in alcohol and in solution of potassa; the alcoholic solution is colored dark brown with ferric chloride.

Varieties.—Sumatra benzoin. Mass brown-gray, melting at 95° C. (203° F.), containing white tears melting at 85° C. (185° F.); odor rather weak, and in Penang benzoin somewhat like storax. Inferior kinds contain few or no tears, and sometimes a large percentage of chips.

Siam benzoin. Mass red-brown, translucent, with a variable proportion of large or small tears; softened and plastic on mastication, melting at 75° C. (167° F.); odor agreeable, vanilla-like; taste slight.

Constituents.—Benzoic acid, $C_7H_6O_2$, 12 to 20 or 24 per cent. (usually fragrant from adhering volatile oil, sublimable, sparingly soluble in cold water), vanillin (in Siam benzoin), cinnamic acid, $C_9H_8O_2$ (variable quantity in Siam and Penang benzoin), several resins, yielding with melted potassa paroxybenzoic acid, $C_7H_6O_3$, protocatechuic acid, $C_7H_6O_4$, and pyrocatechin, $C_6H_6O_2$. Cinnamic acid is detected by boiling benzoin with milk of lime, filtering while warm, and adding potassium permanganate, when the odor of the oil of bitter almond will become apparent.

Properties.—Stimulant, expectorant. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in powder or tincture. Externally as a protective; also in tooth-powders, lotions, and fumigations.

XANTHORRHŒÆ RESINA.—ACAROID RESIN.

Botany Bay resin.

Origin.—Xanthorrhæa hastilis, *R. Brown. Natural order*, Liliaceæ, Lilieæ.

Habitat.—Australia.

Production.—The spontaneous exudation on the leaves and in the stem is separated by crushing and sifting.

Description.—Brownish-yellow, brittle masses, opaque, internally light yellow, resembling gamboge, fusible; odor agreeable balsamic; taste balsamic, somewhat acrid; nearly insoluble in water; soluble in alcohol, and this solution is turned brown-black by ferric chloride.

Red acaroid resin from Xanthorrhœa australis, *R. Brown*, resembles dragon's blood, is deep brown-red, internally bright red, in thin splinters ruby-red and transparent; fracture glass-like; odor balsamic.

Constituents.—Benzoic acid, cinnamic acid, resins. With melting potassa pyrocatechin, paroxybenzoic and protocatechuic acids are obtained.

Properties.—Mild stimulant, tonic. *Dose*, 0.5 to 1 or 2 grams (gr. viij–xv–xxx), in powder, mixture, or tincture.

6. BALSAMS AND OLEORESINS.—BALSAMA ET OLEORESINÆ.

The term balsam is often used to designate unctuous or liquid preparations, chiefly intended for external use, and to which valuable curative powers are attributed. It is also employed for those liquid or soft exudations of plants, which are wholly or chiefly composed of resins and volatile oils, and are properly designated as oleoresins. The British and United States Pharmacopœias restrict the use of the word balsam to those liquid or soft products, which contain resin, an odorous principle, and benzoic or cinnamic acid. Some authors recognize as solid balsams those resins which contain benzoic or cinnamic acid.

Classification.

Sect. 1. Containing benzoic or cinnamic acid:
Balsams.

Liquid, black-brown, aromatic, slightly soluble in oil of turpentine.	Balsamum peruvianum.
Semiliquid or soft, in the cold brittle mass; aromatic, in thin layers transparent.	Balsamum tolutanum.
Thick liquid, brownish-yellow, transparent, aromatic, drying to a yellowish-brown resin.	Liquidambar.

Thick liquid, brown-gray, opaque; after the evaporation of the water, dark-brown, transparent.	Styrax liquidus.
Sect. 2. Free from benzoic or cinnamic acid: Oleoresins.	
Thin or viscid liquid, light yellow or brownish, transparent, odor peculiar.	Copaiba.
Viscid liquid, opaque and grayish in reflected light, transparent and brown in transmitted light; odor like copaiba.	Gurjun.
Thick liquid, transparent, pale yellow; odor pleasantly terebinthinate.	Terebinthina canadensis.
Thick liquid, slightly turbid, pale yellow, somewhat fluorescent; odor terebinthinate.	Terebinthina Veneta.
Viscid, yellowish opaque liquid, becoming granular; or Yellowish-white opaque mass; fracture crummy; odor terebinthinate.	Terebinthina.
Yellowish-brown, opaque, brittle in the cold; fracture conchoidal, translucent.	Pix burgundica
Dark red-brown, opaque, translucent on the edge, brittle in the cold.	Pix canadensis.
Yellowish mass, internally white, granular, opaque.	Elemi.
Thick liquid, black-brown, becoming granular; odor empyreumatic, terebinthinate; soluble in oil of turpentine.	Pix liquida.

BALSAMUM PERUVIANUM.—Balsam of Peru.

Origin.—Myroxylon (Myrospermum, *Royle;* Toluifera, *Baillon*) Pereiræ, *Klotzsch. Natural order,* Leguminosæ, Papilionaceæ.

Habitat.—Central America.

Production.—The bark is loosened by beating, and charred; the exudation is collected on rags, and these are placed in hot water and expressed.

Description.—A rather thick brownish-black liquid, in thin layers red-brown and transparent, of a syrupy consistence; spec. grav. about 1.135 to 1.145; odor agreeably balsamic and somewhat smoky; taste warm bitterish, afterwards acrid. It has an acid reaction to test paper, is completely soluble in five parts of alcohol, and does not diminish in volume when agitated with an equal volume of cold petroleum benzin or water.

Constituents.—Cinnamein or benzylic cinnamate, $C_9H_7(C_7H_7)O_2$, about 60 per cent. (colorless aromatic oil), resin about 32 per cent. (insoluble in carbon disulphide; on dry distillation yields benzoic acid, styrol, C_8H_8, and toluol, C_7H_8), benzalcohol, C_7H_8O, benzylic benzoate, $C_7H_5(C_7H_7)O$, stilbene, $C_{14}H_{12}$, cinnamic and benzoic acids.

Adulterations.—Fixed oils (soluble in petroleum benzin; on trituration with sulphuric acid and washing with water, leave a sticky mass), resins, oleoresins, alcohol.

Properties.—Stimulant expectorant, vulnerary. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in emulsion, syrup, or alcoholic solution; externally in ointment.

BALSAMUM TOLUTANUM.—Balsam of Tolu.

Origin.—Myroxylon (Myrospermum, *Richard*) Toluifera, *Kunth*, s. Toluifera Balsamum, *Miller*. *Natural order*, Leguminosæ, Papilionaceæ.

Habitat.—Venezuela and New Granada.

Production.—The balsam exudes from V-shaped incisions and is received in calabash cups.

Description.—Semifluid or nearly solid, brittle in the cold, yellowish or brownish-yellow and transparent in thin layers; odor agreeably balsamic; taste aromatic, slightly acrid. It is completely soluble in chloroform, ether, and alcohol, the solution being of an acid reaction to test paper, and is almost insoluble in water, petroleum benzin, and carbon disulphide.

Constituents.—Resins (not investigated; the principal constituents), benzylic benzoate, $C_7H_5(C_7H_7)O_2$ (colorless aromatic oil), benzylic cinnamate, tolene, $C_{10}O_{16}$, 1 per cent. (colorless, thin, aromatic oil), cinnamic and benzoic acids.

Adulterations.—Turpentine (soluble in carbon disulphide), sweet gum (yields to warm petroleum benzin styracin, which crystallizes on cooling).

Properties.—Stimulant, expectorant, vulnerary. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in emulsion or tincture, mostly used as an agreeable flavor.

LIQUIDAMBAR.—Sweet Gum.

Origin.—Liquidambar Styraciflua, *Linné*. *Natural order*, Hamamelaceæ, Balsamifluæ.

Habitat.—United States, Mexico, and Central America.

Production.—The balsam exudes spontaneously under a subtropical climate.

Description.—Thick brownish-yellow clear liquid, or a transparent yellowish-brown resin, breaking in the cold with a resinous fracture, showing whitish streaks; softened by the warmth of the hand; odor pleasantly balsamic, storax-like; taste aromatic and pungent; soluble (except the impurities) in alcohol, ether, and chloroform.

Constituents.—Aromatic hydrocarbon 3½ per cent. (not identical with styrol), cinnamic acid 5½ per cent., styracin, and brown tasteless resin.

Properties.—Stimulant, expectorant, diuretic. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in emulsion, also externally in ointment or cerate; mostly used as an agreeable flavor.

STYRAX.—STORAX.

Origin.—Liquidambar orientalis, *Miller.* *Natural order*, Hamamelaceæ, Balsamifluæ.

Habitat.—Asia Minor.

Production.—The inner bark is steeped in hot water, and the melted balsam is skimmed off and expressed from the bark.

Description.—Semiliquid, gray, opaque, separating on standing a heavier dark-brown, in thin layers transparent stratum; odor agreeably balsamic; taste balsamic and acrid; soluble (the impurities excepted) in alcohol, ether, chloroform, and carbon disulphide; warm petroleum benzin, agitated with storax, remains colorless, and, on cooling, deposits white crystals.

Constituents.—Styrol or cinnamene, C_8H_8 (colorless fragrant liquid, at 200° C. converted into solid metacinnamene), cinnamic acid, $C_9H_8O_2$, little benzoic acid, styracin or cinnamyl cinnamate, $C_9H_7(C_9H_9)O_2$ (crystallizing from hot benzin), phenylpropyl cinnamate, $C_9H_7(C_9H_{17})O_2$ (inodorous thick liquid), ethyl cinnamate, $C_9H_7(C_2H_5)O_2$, a small quantity, probably ethyl-vanillin in minute quantity, storesin, $C_{36}H_{58}O_3$, in considerable quantity, and the cinnamic ether of this alcohol; also a resinous compound. Water and other impurities amount to from 25 to 30 per cent.

Properties.—Stimulant, expectorant, diuretic. *Dose*, 0.5 to 2 grams (gr. viij–xxx), in emulsion or tincture; mostly externally in liniment or ointment.

COPAIBA.—COPAIVA.

Origin.—1. Copaifera Langsdorffii, *Desfontaines*. 2. Cop. officinalis, *Linné*, and other species of Copaifera. *Natural order*, Leguminosæ, Cæsalpinieæ.

Habitat.—1. Brazil. 2. Venezuela and New Granada.

Production.—The oleoresin flows from bore-holes or boxes cut through the bark into the heart-wood of the tree.

Description.—A more or less viscid liquid, pale yellow or brown-yellow, transparent or slightly turbid, lighter than water (spec. grav. 0.94–0.99); odor peculiar; taste bitter and acrid; soluble in absolute alcohol, benzol, carbon disulphide, and petroleum benzin.

Varieties.—Para copaiva; pale colored and limpid; usually contains 70 to 85 per cent. of volatile oil.

Maranham and Rio Janeiro copaiva; of the consistence of olive oil; contains 50 to 60, but sometimes 80 per cent. of volatile oil; yields, like Para copaiva, a clear mixture with one-third or one-half ammonia.

Maracaibo copaiba; viscid, dark yellow or brownish, slightly turbid; contains 20 to 40 per cent. of volatile oil; solidifies with magnesia.

Constituents.—Volatile oil, $C_{15}H_{24}$, bitter principle (soluble in water), and resins, bitterish, and mostly amorphous; copaivic acid, $C_{20}H_{30}O_2$, oxycopaivic acid, $C_{20}H_{28}O_3$ (from Para copaiva), and metacopaivic acid, $C_{22}H_{34}O_4$ (from Maracaibo copaiva), are crystalline.

Adulterations.—Turpentine (recognized by odor on warming); fixed oils (mostly insoluble in alcohol; on evaporation a soft and sticky residue is left); Gurjun balsam (is fluorescent, see next page, becomes gelatinous).

Properties.—Stimulant, expectorant, diuretic, laxative, nauseant. *Dose*, 0.5 to 2 or 4 grams (gr. viij–ʒss–j), in emulsion; the resin 0.3 to 0.6 gram (gr. v–x).

GURJUN.—Gurjun Balsam, Wood Oil.

Origin.—Dipterocarpus turbinatus, *Gærtner*, D. alatus, *Roxburgh*, and other species of Dipterocarpus. *Natural order*, Dipterocarpaceæ.

Habitat.—India and East Indian Islands.

Production.—The oleoresin exudes from excavations cut into the wood and charred by fire.

Description.—Thick viscid liquid, opaque and grayish or brownish in reflected light, transparent and brown in transmitted light; spec. grav. 0.95–0.96; odor resembling that of copaiba; taste bitter; soluble in chloroform, volatile oils, and carbon disulphide, partially soluble in alcohol, ether, and petroleum benzin; above 130° C. (266° F.) it becomes permanently gelatinous or solid.

Constituents.—Volatile oil, $C_{15}H_{24}$, 40 to 70 per cent. (dissolved in carbon disulphide, and agitated with a drop of mixed sulphuric and nitric acids, red or violet color is produced), gurjunic acid, $C_{44}H_{68}O_8$ (a small quantity; crystalline), resin (insoluble in potassa solution).

Properties and Uses.—Similar to Copaiva.

TEREBINTHINA CANADENSIS.—Canada Turpentine.

Balsam of fir.

Origin.—Abies balsamea, *Marshall.* *Natural order*, Coniferæ, Abietineæ.

Habitat.—Canada and Northern United States.

Production.—The oleoresin is secreted in vesicles in the bark, and collected by puncturing them.

Description.—A yellowish or faintly greenish transparent viscid liquid, of an agreeable terebinthinate odor, and a bitterish, slightly acrid taste, on exposure drying slowly into a transparent mass; completely soluble in ether, chloroform, and benzol; partly soluble in alcohol.

Constituents.—Volatile oil, $C_{10}H_{16}$, 25 to 30 per cent., uncrystallizable resin, bitter principle soluble in water.

Allied Turpentines.—Oregon Balsam of Fir, from Abies Menziesii, *Lindley*, resembles the preceding in physical properties when fresh; but becomes gradually granular and opaque.

Strassburg Turpentine, Terebinthina argentoratensis, from Abies pectinata, *De Candolle;* like Canada turpentine, but completely soluble in absolute alcohol; odor slightly lemon-like; taste not acrid.

Venice Turpentine, Terebinthina veneta, from Larix europæa, *De Candolle*, procured from the heart-wood by bore-holes; yellowish, greenish-yellow, or brownish, nearly transparent; odor terebinthinate balsamic; taste bitter and acrid; completely soluble in 90 per cent. alcohol; does not become crystalline on drying.

Adulterations.—Solutions of rosin in oil of turpentine, flavored with another volatile oil, are sometimes sold.

Properties.—Stimulant, diaphoretic, diuretic; mostly used externally.

TEREBINTHINA.—TURPENTINE.

Terebinthina communis, s. vulgaris.

Origin.—Pinus australis, *Michaux* (P. palustris, *Miller*), and P. Tæda, *Linné*. *Natural order*, Coniferæ, Abietineæ.

Habitat.—Southern United States.

Production.—Turpentine exudes spontaneously, but is mostly collected in boxes cut into the alburnum.

Description.—Rarely seen in commerce as a yellowish, viscid, more or less opaque liquid. Usually as yellowish, opaque, tough masses, brittle in the cold, softened by the heat of the hand, crummy-crystalline in the interior, of a peculiar odor, and bitter and acrid taste; known as white turpentine; also as Thus americanum or common frankincense, and corresponds to the *galipot* of French commerce.

European Turpentine is obtained from Pinus Pinaster, *Solander*, P. Laricio, *Poiret*, P. sylvestris, *Linné*, and other allied species.

Constituents.—Volatile oil 20 to 30 per cent., abietic anhydrid, crystallizing as abietic acid, $C_{44}H_{64}O_5$; bitter principle soluble in water, small quantities of formic and succinic acids; perhaps also other resin acids (pinic and sylvic acids). Oil of turpentine, $C_{10}H_{16}$, is colorless, dextrogyre, or (the French oil) levogyre; spec. grav. 0.86; boiling point 150°–160° C. (300°–320° F.); readily soluble in strong alcohol; forms with HCl a crystalline compound, $C_{10}H_{16}HCl$ (artificial camphor).

Properties.—Stimulant, diuretic, diaphoretic, astringent. *Dose*, 1 to 4 grams (gr. xv–ʒj), in pills (hardened with magnesia); externally in ointments and plasters. Oil of turpentine, 0.3 to 1 to 2 grams (gr. v–xv–xxx), in emulsion; externally in liniments.

Terebinthina Chia, Chian turpentine, from Pistacia Terebinthus, *Linné* (Anacardiaceæ), is greenish-yellow or brownish, hardens to a transparent mass, and has a fennel-like terebinthinate odor, and a mild bitterish taste.

PIX BURGUNDICA.—BURGUNDY PITCH.

Origin.—Abies excelsa, *De Candolle*, s. Pinus Abies, *Linné*. *Natural order*, Coniferæ, Abietineæ.

Habitat.—Europe, in the southern part, in mountainous districts.

Production.—The oleoresin exudes spontaneously and from incisions, is melted in hot water, and strained.

Description. — Yellowish-brown or reddish-brown, opaque or translucent, not crystalline; hard, yet gradually taking the form of the vessel in which it is kept; brittle when cold; fracture shining, conchoidal; aromatic, not bitter; soluble in glacial acetic acid and strong alcohol.

Allied Products.—Resina pini; white turpentine fused in hot water and strained; resembles the preceding, but gradually becomes crystalline.

Terebinthina cocta; the residue from the distillation of turpentine with water, strained.

Constituents.—Volatile oil, $C_{10}H_{16}$, in variable proportion, water, and resin.

Substitution.—A mixture of rosin, palm oil or other fat, and water; incompletely soluble in warm glacial acetic acid.

Properties.—Stimulant, irritant; used in plasters.

PIX CANADENSIS.—CANADA PITCH. HEMLOCK PITCH.

Origin.—Abies (Pinus, *Linné*) canadensis, *Michaux*. *Natural order* Coniferæ, Abietineæ.

Habitat.—Canada and Northern United States.

Production.—The oleoresin exudes from incisions; the wood and bark, rich in oleoresin, are heated in water, the melted oleoresin is skimmed off, remelted, and strained.

Description.—Dark reddish-brown, opaque or translucent, not crystalline; hard, yet gradually taking the form of the vessel in which it is kept; brittle when cold; fracture shining, conchoidal; odor weak, terebinthinate, balsamic.

Adulteration.—Rosin.

Constituents.—Little volatile oil, water, and resins.

Properties.—Stimulant, irritant; used in plasters.

ELEMI.—Elemi.

Origin.—Probably from Canarium commune, *Linné*. *Natural order*, Burseraceæ, Bursereæ.

Habitat.—Philippine Islands.

Production.—The oleoresin exudes from incisions.

Description.—Soft, yellowish, granular, more or less crystalline; when old friable; odor strong, resembling fennel and lemon, somewhat terebinthinate; taste bitter, disagreeable, and pungent.

Constituents.—Volatile oil, $C_{10}H_{16}$, 10 per cent., breïn 60 per cent. (amorphous resin readily soluble in cold alcohol), amyrin 25 per cent. (resin crystallizing from hot, strong alcohol), bryoidin (easily soluble in alcohol, bitter and acrid, crystallizes from hot water), breïdin (crystalline, less soluble in water and ether), elemic acid, $C_{35}H_{56}O_4$ (crystalline).

Varieties.—Manila elemi, described above.

Brazilian elemi, from Icica Icicariba, *De Candolle*, and allied species; yellowish-white or greenish-white, fragrant.

Mauritius elemi, from Colophonia mauritiana, *De Candolle*, resembles Manila elemi.

Mexican elemi, probably from Amyris elemifera, *Royle;* yellow or greenish, more or less translucent, of waxy lustre.

Properties.—Stimulant, irritant; used in plasters and ointment.

PIX LIQUIDA.—TAR.

Origin.—The wood of different species of Pinus. *Natural order*, Coniferæ, Abietineæ.

Production.—The wood is subjected to destructive distillation, either in retorts or packed in stacks covered with earth.

Description.—Thick viscid semifluid, heavier than water, blackish-brown, transparent in thin layers, becoming granular and opaque by age; odor empyreumatic, terebinthinate; taste sharp, empyreumatic, and bitterish; of an acid reaction; soluble in alcohol, volatile oils, and potassa solution; slightly soluble in water.

Constituents.—Acetic acid, acetone, methylic alcohol, mesit, toluol, xylol, cumol, methol; these pass over with the light oil of tar. Naphthalin, pyrene, chrysene, retene, paraffin, phenols, creasote, pyrocatechin, empyreumatic resin. The composition of commercial tar is variable.

Pyrocatechin or catechol, $C_6H_6O_2$, is crystalline, sublimable, readily soluble in water, alcohol, and ether, has a sharp persistent taste, and in aqueous solution becomes dark green with ferric chloride, changing to violet with ammonia.

Allied Products.—Juniper tar, Oil of Cade, from the wood of Juniperus Oxycedrus, *Linné*; it is more liquid, and of a somewhat different odor.

Birch tar, Dagget, from the wood of Betula alba, *Linné*, has the peculiar odor of Russian leather, and contains much pyrocatechin.

Properties.—Stimulant, irritant, insecticide. *Dose*, 0.3 to 1.5 gram (gr. v–xxij), in pills, mixtures, and aqueous or vinous infusions; externally in ointment, plaster, and as fumigation.

7. VOLATILE OILS AND CAMPHORS.—OLEA VOLATILIA ET CAMPHORÆ.

Volatile oils are odorous volatile liquids which produce upon paper a greasy stain, disappearing on the application of heat. They are readily soluble in absolute alcohol, ether, chloroform, petroleum benzin, benzol, carbon disulphide, and fixed oils, and many of them dissolve also freely in 80 per cent. alcohol. All are but slightly soluble in water. They exist ready-formed in plants, but in some cases (volatile oils of mustard, almond, etc.) are the results of chemical action in the presence of water. They are mostly obtained by distillation with water, occasionally by expression of the parts containing them, like the volatile oils of lemon, orange peel, etc.

Volatile oils are usually mixtures of two or more compounds, differing in volatility and odor, the portion volatilizing first being sometimes designated as *elæopten*, and the portion volatilizing last as *stearopten* or *camphor*. The latter usually contains oxygen, the former mostly consists of carbon and hydrogen; a few volatile oils (of mustard, garlic, asafetida) contain sulphur, and in the volatile oils of amygdaleæ (almond, etc.) nitrogen is found combined to hydrocyanic acid. The existing in volatile oils are mostly imperfectly known; but besides the hydrocarbons, some of these have been proved to belong to the classes of alcohols, aldehyds, ethers, and compound ethers. The yellow, blue, and brown color of volatile oils is due to distinct compounds.

On exposure to the air, more particularly in the presence of light and moisture, volatile oils become darker and thicker or even solid from resinification; the addition of a little alcohol will usually retard or prevent these changes.

As a class, the volatile oils consisting of hydrocarbons are lightest in color and in specific gravity (the latter generally ranging between 0.85 and 0.91), are less prone to resinification, and are not freely soluble in 85 per cent. alcohol. The oxygenated volatile oils have usually a density from 0.90 to 0.99, and several of them are heavier than water, some being 1.10. They are mostly more freely soluble in 80 per cent. alcohol, are usually more or less colored, and the color is deepened on exposure.

Adulterations.—Chloroform (adapted only for the heavy volatile oils) is readily detected on fractional distillation at a temperature of about 70° C. (158° F.).

Alcohol will dissolve or soften fragments of fused calcium chloride or dry potassium acetate. Agitation with water will cause a diminution of volume.

Fixed oils will leave a permanent greasy stain on paper; on agitation with 80 per cent. alcohol, the volatile oil will be dissolved and the fixed oil left behind.

Cheap volatile oils are recognized by their odor on the slow evaporation from bibulous paper or from the hands. The behavior to alcohol and to various chemical reagents is sometimes of value.

CAMPHORA.—Camphor.

Origin.—Cinnamomum (Laurus, *Linné*) Camphora, *F. Nees et Ebermaier*, s. Camphora officinarum, *C. Bauhin.* *Natural order*, Lauraceæ.

Habitat.—China and Japan.

Production.—The branches and wood are exposed to the vapors of boiling water, the volatilized camphor is condensed, drained and pressed from the adhering volatile oil (oil of camphor), and subsequently refined by sublimation in vessels of glass or iron.

Description.—Crude camphor is in whitish granular masses, that from Japan having often a reddish tint, while Formosa camphor is grayish or blackish and more impure. Refined camphor is in translucent masses of a tough consistence and crystalline texture, readily pulverizable in the presence of a little alcohol or ether, has the spec. grav. 0.98, melts at 175° C. (347° F.), boils at 205° C. (401° F.), sublimes and burns without leaving any residue; odor penetrating, peculiar; taste pungent; readily soluble in alcohol and ether; sparingly soluble in water.

Composition.—$C_{10}H_{16}O$. Heated with zinc chloride it yields cymol, $C_{10}H_{14}$, and with nitric acid, camphoric acid, $C_{10}H_{16}O_4$, and camphoronic acid, $C_9H_{12}O_5$.

Allied Camphor.—Borneo, Sumatra, or Barus camphor, from Dryobalanops Camphora, *Colebrook*, *Natural order*, Dipterocarpaceæ, has a somewhat different odor, is slightly heavier than water, less readily volatile, and with nitric acid yields ordinary camphor.

Properties.—Stimulant, antispasmodic, sedative, rubefacient, resolvent. *Dose*, 0.06 to 0.5 [illegible] j–viij–xv), in pills or emulsion; externally in liniments and ointments.

THYMOL.—Thymol.

Origin.—Thymus vulgaris, *Linné*, Ptychotis Ajowan, *De Candolle*, Monarda punctata, *Linné*. *Natural order*, Labiatæ.

Production.—By fractional distillation, by freezing, or by means of alkali solution.

Properties.—Colorless rhombic scales or flat prisms of a thyme-like odor and pungent taste; melts at 50° C. (122° F.), boils at 230° C. (446° F.); freely soluble in simple solvents (sparingly in water) and in alkalies; liquefied by camphor. The aqueous solution is precipitated by bromine water, but is not colored by ferric chloride.

Composition.—$C_{10}H_{14}O$.

Properties.—Stimulant, antiseptic. *Dose*, 0.1 to 0.3 gram (gr. jss–v); used mostly externally.

MENTHOL.—Pipmenthol.

Origin.—Mentha piperita, *Linné*. *Natural order*, Labiatæ.

Production.—By fractional distillation of the volatile oil.

Properties.—Fine white needles, transparent when examined singly, of an agreeable peppermint odor and taste; melts at 42° C. (76° F.); boils at 212° C. (414° F.); freely soluble in most simple solvents, sparingly soluble in water.

Japanese or Chinese menthol, from a plant allied to Mentha canadensis, *Linné*, resembles pipmenthol, but is usually moist from presence of oil, and has a mint-like odor, not identical with that of peppermint.

Composition.—$C_{10}H_{20}O$.

Properties.—Stimulant, rubefacient, anodyne. *Dose,* 0.1 to 0.3 gram (gr. jss–v); used externally.

OLEUM CAMPHORÆ.—OIL OF CAMPHOR.

Origin and Production.—See Camphora.

Description.—Deep yellow or yellowish-brown; spec. grav. 0.94; boiling point about 180° C. (356° F.); odor and taste strongly camphoraceous; completely soluble in alcohol.

Composition.—Hydrocarbon, $C_{10}H_{16}$, and camphor, which crystallizes in the cold.

Properties.—Like camphor, mostly used in liniments.

OLEUM CAJUPUTI.—OIL OF CAJEPUT.

Origin.—Melaleuca Cajuputi, *Roxburgh*, s. M. minor, *Smith*, s. M. Leucadendron, var. *Bentham. Natural order*, Myrtaceæ.

Habitat.—East Indian Islands.

Production.—The leaves are distilled with water.

Description.—Green or, after rectification, colorless or yellowish, neutral, very mobile; spec. grav. about 0.92; odor aromatic; taste warm, camphoraceous, cooling; not congealing at —25° C. (—13° F.).

Constituents.—Chiefly cajuputol, $C_{10}H_{18}O$. The crude (green) oil often contains a trace of copper, which yields a red-brown color or precipitate on agitating the oil with warm dilute hydrochloric acid and adding potassium ferrocyanide to the watery liquid.

Properties.—Carminative, stimulant, diaphoretic, rubefacient, counter-irritant. *Dose*, 0.1 to 0.5 or 0.1 gram (gr. jss–viij–xv), in mixtures; externally in liniments.

OLEUM ROSÆ.—OIL OF ROSE. ATTAR OF ROSE.

Origin.—Rosa damascena, *Miller. Natural order*, Rosaceæ, Roseæ.

Habitat.—Cultivated in Rumelia.

Production.—The flowers are distilled with water, cohobation being resorted to.

Description.—Pale yellow liquid, spec. grav. 0.86, of an agreeable rose odor when diluted, and a sweetish taste; separating at or below 15° C. (59° F.) transparent scaly crystals, which remain suspended in the liquid.

Constituents.—Elæopten containing oxygen, very fragrant, readily soluble in alcohol; stearopten, probably $C_{16}H_{32}$ or $C_{16}H_{34}$, inodorous, iridescent crystals, requiring about 100 parts of alcohol for solution.

Adulterations.—Spermaceti and paraffin crystallize in a rather opaque crust. An addition of oil of ginger-grass or roshé oil from Andropogon Schœnanthus, *Linné*, lowers the congealing point of attar of rose.

Uses.—For perfuming ointments and mixtures.

OLEUM SUCCINI.—OIL OF AMBER.

Production.—Amber is subjected to destructive distillation, and the thick brown liquid distillate is rectified.

Description.—Pale yellow, spec. grav. 0.91–0.95; odor empyreumatic, balsamic; taste warm and acrid;

soluble in 4 parts of strong alcohol; with nitric acid it acquires a red color, and after some time is almost wholly converted into a brown resinous mass, having a musk-like odor.

Adulterations.—Petroleum and the empyreumatic oils of resins.

Properties.—Stimulant, antispasmodic, irritant. *Dose*, 0.2 to 0.5 or 1 gram (gr. iij–viij–xv), in capsules or emulsion; externally in liniments.

Syllabus of the Officinal Volatile Oils.

Magnoliaceæ.

Oleum Anisi (stellati), from the fruit of Illicium anisatum, *Loureiro.* Pale yellow, congeals at about 2° C. (35.6° F.), spec. grav. 0.98, sweet; consists of $C_{10}H_{16}$ and anethol, $C_{10}H_{12}O$.

Cruciferæ.

Oleum Sinapis, from the seeds of Brassica nigra, *Koch.* Yellow, neutral, spec. grav. 1.018, pungent and acrid, soluble in 3 parts of sulphuric acid without change of color; chiefly allyl sulphocyanide, $C_3H_5.CNS$.

Rutaceæ.

Oleum Rutæ, from the herb of Ruta graveolens, *Linné.* Greenish-yellow, neutral, spec. grav. 0.88, bitterish; congeals below 0° C. (32° F.), solution in sulphuric acid brown-red; chiefly methyl-nonyl-ketone, $CH_3.CO.C_9H_{19}$.

Aurantiaceæ.

Oleum Limonis, from the rind of Citrus Limonum, *Risso.* Yellowish, neutral, spec. grav. 0.85, bitterish; chiefly $C_{10}H_{16}$.

Oleum Bergamii, from the rind of Citrus Bergamia, var. vulgaris, *Risso.* Greenish, faintly acid, spec. grav. 0.87, bitterish; consists of $C_{10}H_{16}$ and hydrates.

Oleum Aurantii amari, from the rind of Citrus vulgaris, *Risso.* Yellowish, neutral, bitterish, spec. grav. about 0 86; chiefly $C_{10}H_{16}$.

Oleum Aurantii dulcis, from the rind of Citrus Aurantium, *Risso.* Yellowish, neutral, spec. grav. about 0.86; chiefly $C_{10}H_{16}$; readily altered.

Oleum Aurantii florum, from the flowers of Citrus vulgaris, *Risso*. Colorless or brownish, neutral, bitterish, spec. grav. about 0.88; chiefly $C_{10}H_{16}$. Yields violet fluorescence with alcohol.

Leguminosæ.

Oleum Copaibæ, from the oleoresin of Copaifera spec. Colorless, neutral, spec. grav. 0.89; consists of $C_{15}H_{24}$.

Rosaceæ.

Oleum Amygdalæ amaræ, from the seeds of Amygdalus communis, *Linné*, var. amara, *De Candolle*. Yellowish, slightly bitter, spec. grav. 1.07 (1.046, if deprived of HCN); chiefly benzaldehyd, C_7H_6O with HCN, in old oil benzoic acid. Evaporated with potassa and alcohol, the residue, dissolved in distilled water, yields a nearly transparent solution, free from brown-yellow sediment.

Oleum Rosæ (see page 469).

Myrtaceæ.

Oleum Cajuputi (see page 468).

Oleum Eucalypti, from the leaves of Eucalyptus globulus and Euc. amygdalina, *Labillardière*. Yellowish, neutral, spicy and cooling; contains $C_{10}H_{14}$, $C_{10}H_{16}$, and $C_{10}H_{16}O$.

Oleum Caryophylli, from the flower-buds of Eugenia caryophyllata, *Thunberg*. Yellowish-brown, slightly acid, spec. grav. 1.05; contains $C_{10}H_{16}$ and eugenol, $C_{10}H_{12}O_2$.

Oleum Pimentæ, from the fruit of Eugenia Pimenta, *De Candolle*. Colorless or pale yellow, slightly acid, spec. grav. 1.04; contains $C_{10}H_{16}$ and $C_{10}H_{12}O_2$.

Oleum Myrciæ, from the leaves of Myrcia acris, *De Candolle*. Yellowish or brownish-yellow, slightly acid, spec. grav. 1.04; contains $C_{10}H_{16}$ and $C_{10}H_{12}O_2$. The last three oils congeal with potassa, and their alcoholic solution is colored purplish-blue by Fe_2Cl_6.

Umbelliferæ.

Oleum Carui, from the fruit of Carum Carui, *Linné*. Colorless or yellowish, neutral, spec. grav. 0.92; contains carvene, $C_{10}H_{16}$, and carvol, $C_{10}H_{14}O$; the latter is colored light violet by Fe_2Cl_6, and congeals with ammonia and sulphydric acid.

Oleum Fœniculi, from the fruit of Fœniculum vulgare, *Gærtner*. Colorless, neutral, sweet, spec. grav. 0.97; congeals near 0° C. (32° F.); contains $C_{10}H_{16}$ and anethol, $C_{10}H_{12}O$.

Oleum Anisi, from the fruit of Pimpinella Anisum, *Linné*. Colorless or yellowish, neutral, sweet, spec. grav. 0.98; congeals near 10° C. (50° F.); contains $C_{10}H_{16}$ and anethol, $C_{10}H_{12}O$.

Oleum Anethi, from the fruit of Anethum graveolens, *Linné*. Pale yellow, neutral, sweetish, spec. grav. 0.87; anethene, $C_{10}H_{16}$, and carvol.

Oleum Coriandri, from the fruit of Coriandrum sativum, *Linné*. Colorless or yellowish, neutral, sweet, spec. grav. 0.87; chiefly $C_{10}H_{18}O$.

Valerianaceæ.

Oleum Valerianæ, from the rhizome and rootlets of Valeriana officinalis, *Linné*. Yellowish or brownish, somewhat viscid, slightly acid, spec. grav. 0.95; contains borneene, $C_{10}H_{16}$, borneol, $C_{10}H_{18}O$, its ether, $(C_{10}H_{17})_2O$, and its valerianic ether.

Compositæ.

Oleum Anthemidis, from the flowers of Anthemis nobilis, *Linné*. Pale blue, green, or yellow, slightly acid, spec. grav. 0.90; contains the butyl and amyl ethers of angelic, valerianic, and tiglinic acids.

Oleum Erigerontis, from the herb of Erigeron canadense, *Linné*. Pale yellow, neutral, spec. grav. 0.85; $C_{10}H_{16}$, and oxygenated compound.

Ericaceæ.

Oleum Gaultheriæ, from the leaves of Gaultheria procumbens, *Linné*. Yellowish or reddish, slightly acid, sweetish, spec. grav. 1.17; chiefly methyl salicylate, $CH_3.C_7H_5O_3$; yields with nitric acid colorless crystals. Much of the commercial oil of wintergreen is distilled from the bark of the sweet birch, Betula lenta, *Linné* (*Natural order*, Betulaceæ).

Labiatæ.

Oleum Lavandulæ, from the flowers (and leaves) of Lavandula vera, *De Candolle*. Colorless or yellowish, neutral, bitterish spec. grav. about 0.90; contains $C_{10}H_{16}$, and formic, acetic, and other ethers of the alcohols $C_{10}H_{18}O$ and $C_{10}H_{16}O$. The oil from the flowers is most fragrant.

Oleum Menthæ viridis, from the herb of Mentha viridis, *Linné*. Pale yellow, neutral, spec. grav. 0.90; contains $C_{10}H_{16}$ and a compound, $C_{10}H_{14}O$.

Oleum Menthæ piperitæ, from the herb of Mentha piperita, *Linné.* Pale yellow or greenish, neutral, taste warm and cooling, spec. grav. 0.90; contains $C_{10}H_{18}O$ and menthol, $C_{10}H_{20}O$ (see page 467).

Oleum Thymi, from the herb of Thymus vulgaris, *Linné.* Red-brown or yellowish, neutral, spec. grav. 0.88; contains cymene, $C_{10}H_{14}$, thymene, $C_{10}H_{16}$, and thymol, $C_{10}H_{14}O$ (see page 467).

Oleum Hedeomæ, from the herb of Hedeoma pulegioides, *Persoon.* Colorless or pale yellow, neutral, spec. grav. 0.94; contains oxygen.

Oleum Rosmarini, from the leaves of Rosmarinus officinalis, *Linné.* Colorless, neutral, spec. grav. 0.90; contains $C_{10}H_{16}$, $C_{10}H_{16}O$, and $C_{10}H_{18}O$.

Myristicaceæ.

Oleum Myristicæ, from the kernel of Myristica fragrans, *Houttuyn.* Colorless, neutral, spec. grav. 0.93; chiefly myristicene, $C_{10}H_{16}$, also myristicol, $C_{10}H_{14}O$.

Chenopodiaceæ.

Oleum Chenopodii, from the fruit of Chenopodium ambrosioides, *Linné,* var. anthelminticum, *Gray.* Pale yellow, neutral, bitterish, spec. grav. 0.92; $C_{10}H_{16}$ and $C_{10}H_{16}O$.

Lauraceæ.

Oleum Cinnamomi, from the bark of Cinnamomum zeylanicum, *Breyne.* Yellow or reddish, slightly acid, sweet and spicy, spec. grav. 1.04; chiefly cinnamic aldehyd, C_9H_8O, also hydrocarbons; in old oil cinnamic acid.

Oleum Cinnamomi Cassiæ, from the bark of Cinnamomum Cassia, *Blume.* Like the preceding; flavor less agreeable; spec. grav. about 1.06.

Oleum Sassafras, from the root of Sassafras officinale, *Nees.* Yellowish or brownish, neutral, spec. grav. 1.09; contains safrene, $C_{10}H_{16}$, and chiefly safrol, $C_{10}H_{10}O_2$; with nitric acid dark red and resinous.

Piperaceæ.

Oleum Cubebæ, from the fruit of Cubeba officinalis, *Miquel.* Colorless or faintly greenish or yellowish, neutral, spec. grav. 0.92; consists of $C_{10}H_{16}$ and $C_{15}H_{24}$.

Santalaceæ.

Oleum Santali, from the wood of Santalum album, *Linné.* Light yellow, rather thick, slightly acid, spec. grav. 0.96; contains $C_{15}H_{24}O$ and $C_{15}H_{26}O$.

Coniferæ.

Oleum Terebinthinæ, from the oleoresin of different species of Pinus. Colorless, neutral, bitterish, spec. grav. 0.87; consists of $C_{10}H_{16}$.

Oleum Juniperi, from the fruit of Juniperus communis, *Linné.* Colorless or faintly greenish, neutral, sweetish, spec. grav. 0.87; consists of $C_{10}H_{16}$.

Oleum Sabinæ, from the branches (tops) of Juniperus Sabina, *Linné.* Colorless, neutral, bitterish, spec. grav. 0.91; consists of $C_{10}H_{16}$.

Oleum Picis liquidæ, from pine wood tar. Yellowish or red-brown, acid, odor and taste tar-like; consists mainly of $C_{10}H_{16}$.

8. FIXED OILS AND WAXES.—OLEA PINGUIA ET CERÆ.

Fats are found in plants and animals, and are mostly colorless or white, inodorous and tasteless; but some commercial fats always contain coloring matter and volatile oil or other odorous principle, and the fats of the volatile fatty acids have a distinct odor. All fats are lighter than water (spec. grav. mostly between 0.913 and 0.956), are insoluble in water and mostly also in cold alcohol; they are soluble in ether, chloroform, petroleum benzin, benzol, and carbon disulphide. The liquid fats are transparent; the solid fats melt, by heat, to a transparent liquid. The mucilaginous and protein compounds, often present in crude fats, are removed by decantation, by filtration, or by treatment with about 2 per cent. of sulphuric acid. The color of certain fats is destroyed by heat, or by exposure to sunlight, or by treatment with potassium dichromate and sulphuric acid.

Most fats are mixtures of two or more compounds, the most important of which are stearin, $C_3H_5.3C_{18}H_{35}O_2$; palmitin, $C_3H_5.3C_{16}H_{31}O_2$; myristin, $C_3H_5.3C_{14}H_{27}O_2$; laurin, $C_3H_5.3C_{12}H_{23}O_2$; and olein, $C_3H_5.3C_{18}H_{33}O_2$. The drying oils which gradually harden on exposure to the air, contain linolein, the acid having the formula $C_{16}H_{28}O_4$. Fats become rancid through the generation of volatile fatty acids and perhaps of other compounds. On saponification most of the liquid and solid fats yield glycerin, $C_3H_8O_3$. Soaps made with potassa are softer than soda soaps, and the soaps of drying oils are softer than those prepared from non-drying oils.

Fats having a high fusing point, are often called waxes; but this name is more properly applied to the compounds of the fatty acids with the radicals of monatomic alcohols, such as cetyl, $C_{16}H_{33}$ (in spermaceti), ceryl, $C_{27}H_{55}$ (in Chinese wax), and myricyl, $C_{30}H_{61}$ (in beeswax).

Adulterations.—The detection is difficult. The specific gravity, the melting point, and the congealing point should be observed. Drying and non-drying oils are distinguished by the effect of nitrous acid, which causes the latter to congeal in the course of two or three hours to one or two days, through the conversion of liquid olein into solid elaidin; linolein and allied oils are not affected by this agent. The test is applied by mixing 2 parts of nitric acid, spec. grav. 1.42, 3 parts cf water, and 5 parts of the oil, and adding 1 part of copper. Maumené's sulphuric acid test is applied by stirring together 50 grams of the oil and 10 cubic centimeters of sulphuric acid, and noting the rise of temperature. Heydenreich's test consists in adding to 10 or 12 drops of the oil 2 or 3 drops of sulphuric acid, noting the color, then stirring and again noting the color. For Calvert's test, 1 volume of sulphuric acid, spec. grav. 1.53, is agitated for about five minutes with 5 volumes of the oil, after which the color is observed.

	TESTS.			
Oil of	Nitrous acid.	Maumené's.	Heydenreich's.	Calvert's.
Almond	whitish, solid	52° C	yellow	white.
Arachis	whitish, solid	67	yellow, green-brown	yellow.
Cod-liver	yellow, liquid	102	purple, red	purple.
Cotton seed	yellow, soft	—	reddish and brown	yellow.
Hemp	yellow, liquid	98	brown, black, solid	dark green.
Lard	yellow, solid	43	yellow, brown	yellowish.
Linseed	brownish, liquid	103	brown-red, blackish	dark green.
Olive	yellowish, solid	42	yellow, brownish	greenish.
Poppy	yellow, liquid	—	yellow, brown-green	grayish.
Rapeseed	brownish, soft	58	green or brownish	brown.
Ricinus	whitish, soft	47	brownish	grayish-white.
Sesame	red-brown, soft	68	brown-red, gelatinous	dirty-green.
Sunflower	yellow, soft	—	red-brown, brown	yellow.

Classification.

Sect. 1. Liquid fats.

I. Non-drying oils.

Yellowish, slightly nutty, not congealing at —10° C.	Ol. Amygdalæ expressum.
Pale yellow, deposits granules near 0° C.	Ol. Olivæ.
Pale yellow, opaque at 0° C.	Ol. bubulum.
Yellowish, solidifying near 0° C.	Ol Adipis.

II. Drying oils.

Yellow or brownish; not solid at —15° C.	Ol. Lini.
Pale yellow, bland, congeals at —18° C.	Ol Papaveris.
Nearly colorless, nutty; congeals at —20° C.	Ol. Juglandis.
Green, unpleasant; congeals at —15° C.	Ol. Cannabis.

III. Intermediate oils.	
Yellow, odor and taste fishy.	Ol. Morrhuæ.
Brownish-yellow, acrid.	Ol. Tiglii.
Yellowish, mawkish, slightly acrid.	Ol. Ricini.
Yellow, bland, congeals below 0° C.	Ol. Gossypii.
Yellow, bland, congeals at —5° C.	Ol. Sesami.
Sect. 2. Solid fats.	
I. Containing volatile oil.	
Butyraceous, granular, green, spicy.	Ol. Lauri.
Mottled orange-brown, melting at 45° C.	Ol. Myristicæ expressum.
II. Odorous, but free from volatile oil.	
Yellowish-white, chocolate odor, melting at 30° C.	Ol. Theobromæ.
Orange-red, violet odor, melting at 27° C.	Ol. Palmæ.
Brownish-white, acrid, melting at 42° C.	Ol. Gynocardiæ.
White, disagreeable odor, melting at 23° C.	Ol. Cocois.
Yellow, sweet, melting at 28° C.	Butyrum.
III. With no characteristic odor.	
White, melting at 35° C.	Adeps.
White, melting at 45° C.	Sevum.
Sect. 3. Waxes.	
White, crystalline, melting at 50° C.	Cetaceum.
Yellow or white, melting at 62° C.	Cera.

OLEUM AMYGDALÆ EXPRESSUM.—
ALMOND OIL.

Origin.—Amygdalus communis, *Linné*. *Natural order*, Rosaceæ, Amygdaleæ.

Habitat.—Western Asia, naturalized in the Mediterranean basin; cultivated.

Production.—Crushed bitter almonds are subjected to powerful pressure preceding their being used for preparing oil of bitter almond. Sweet almonds are likewise occasionally expressed. Yield 40 to 50 or 55 per cent.

Description.—Yellowish, thin, spec. grav. 0.92, congealing near —20° C. (—4° F.), of a slight nutty odor and bland taste. A mixture of the oil with an equal bulk of nitric acid, spec. grav. 1.16, on being warmed to 60° C. (140° F.) will not acquire a yellow or orange color.

Constituents.—Chiefly olein, very little palmitin.

Substitution.—The fixed oils expressed from the seeds of the peach and apricot closely resemble almond oil; but warmed with nitric acid, spec. grav. 1.16, speedily turn yellow and orange-red.

Properties.—Lenitive. *Dose*, 2 to 16 grams (ʒss–iv), in emulsion; externally in liniments and ointments.

OLEUM OLIVÆ.—Olive Oil.

Origin.—Olea europæa, *Linné.* *Natural order*, Oleaceæ.

Habitat.—Southern Europe; cultivated.

Production.—The crushed fruit, subjected to cold pressure, yields virgin oil; a second quality of oil is obtained by mixing the press cake with hot water, and again expressing; and an inferior more or less rancid oil is yielded from the residue after it has undergone decomposition.

Description.—Pale yellow or light greenish-yellow, spec. grav. 0.918; near 5° C. (41° F.) separating white crystalline granules; of a slight agreeable odor, and a bland, faintly acrid taste. The mixture, made upon a porcelain slab, of 10 drops of the oil and 5 or 6 drops of sulphuric acid, does not acquire a brown-red or greenish-brown color. Agitated with a cold mixture of sulphuric and nitric acids it remains pale yellow or greenish.

Constituents—Mainly olein; the solid fats are chiefly palmitin with arachin and possibly stearin; also cholesterin, $C_{26}H_{44}O$, soluble in alcohol.

Properties and Uses.—Like Almond Oil.

OLEUM BUBULUM.—NEAT'S-FOOT OIL.

Production.—The fatty tissue of neat's feet is boiled with water and the fat skimmed off and strained.

Description.—Pale yellow, spec. grav. about 0.915, opaque at or below 0° C. (32° F.); odor slight; nearly tasteless.

Constituents.—Olein and solid fats.

Uses.—Chiefly externally.

OLEUM ADIPIS.—LARD OIL.

Production.—Lard is exposed to a low temperature and expressed. Yield about 50 to 60 per cent.

Description.—Pale yellowish or colorless, spec. grav. about 0.916, solidifying near 0° C. (32° F.); odor and taste slight.

Constituents.—Olein with palmitin and stearin.

Uses.—Externally.

OLEUM LINI.—FLAXSEED OIL. LINSEED OIL.

Origin.—Linum usitatissimum, *Linné*. *Natural order*, Linaceæ.

Habitat.—Levant and Southern Europe; cultivated.

Production.—The crushed seeds are expressed; yield by cold pressure 16 to 20 per cent.; by hot pressure 25 to 28 per cent.

Description.—Yellow, limpid, spec. grav. about 0.936, congealing at —27° C. (—16.5° F.); odor slight; taste bland. Expressed with heat, linseed oil is of a darker color, stronger odor and acrid taste.

Constituents.—Chiefly linolein, with palmitin and myristin. By exposure it dries to linoxyn, $C_{32}H_{54}O_{11}$.

Properties.—Demulcent, laxative. *Dose,* 4 to 65 grams (ʒj–℥ij); externally as a protective.

OLEUM PAPAVERIS.—POPPYSEED OIL.

Origin.—Papaver somniferum, *Linné.* *Natural order* Papaveraceæ.

Habitat.—Western Asia; cultivated.

Production.—The crushed seeds are expressed. Yield about 50 per cent.

Description.—Pale yellow, limpid, spec. grav. 0.92; congealing at about —18° C. (0° F.); odor slight; taste bland.

Constituents.—Chiefly linolein, with palmitin and perhaps other fats.

Properties.—Demulcent and protective.

OLEUM JUGLANDIS.—NUT OIL.

Origin.—1. Juglans regia, *Linné.* 2. Juglans cinerea, *Linné.* 3. Carya amara, *Nuttall.* *Natural order,* Juglandaceæ.

Habitat.—1. Central Asia; cultivated. 2, 3. North America.

Production.—The crushed seeds are expressed; yield about 25 per cent.

Description.—Pale greenish or nearly colorless, somewhat thicker than the preceding, spec. grav. 0.92 congealing at about —18° C. (0° F.); odor and taste nutty.

Constituents.—Probably linolein with some solid fats.

Properties.—Like Poppyseed Oil.

OLEUM CANNABIS.—Hempseed Oil.

Origin.—Cannabis sativa, *Linné*. *Natural order*, Urticaceæ, Cannabineæ.

Habitat.—Southern and Central Asia; cultivated.

Production.—The crushed fruit (hempseed) is expressed; yield about 30 per cent.

Description.—Green, becoming lighter and brownish on exposure; spec. grav. 0.93; odor unpleasant; taste rather mild; thickens at —15° C. (5° F.).

Constituents.—Linolein, probably with palmitin.

Properties.—Like Poppyseed Oil.

OLEUM MORRHUÆ.—Cod-liver Oil.

Oleum jecoris aselli.

Origin.—Gadus Morrhua, *Linné*, and other species of Gadus. *Class*, Pisces. *Order*, Teleostia. *Family*, Gadida.

Habitat.—North Atlantic Ocean.

Production.—The fresh livers are slowly heated and the oil is decanted from the water.

Description.—Pale yellow, limpid, faintly acid, spec. grav. 0.92; near 0° C. (32° F.) separating a white granular deposit; odor and taste mild, fishy. Sulphuric acid colors it deep violet, changing to brown-red. If obtained by means of a greater heat, by boiling with

water, or from stale livers, cod-liver oil has an amber-**brown or dark-brown color**, a stronger acid reaction, a **more disagreeable odor and** more or less bitter taste, and **deposits granules at a higher** temperature.

***Constituents.*—Chiefly olein**, with palmitin and stearin, **iodine 0.00001 to 0.0004** per cent., traces of chlorine, **bromine, phosphorus, and** sulphur, biliary compounds, **probably also butyric and acetic** acids.

***Properties.*—Demulcent**, alterative. *Dose*, 8 to 16 **grams (ʒij–℥ss).**

OLEUM TIGLII.—Croton Oil.

Origin.—Croton Tiglium, *Linné*. *Natural order*, Euphorbiaceæ.

Habitat.—India and Philippine Islands; cultivated.

Production.—The crushed seeds are expressed or are exhausted by carbon disulphide; yield 30 to 40 per cent., or about 50 per cent. of the kernels.

Description.—Yellow or brownish-yellow, somewhat viscid, slightly acid, spec. grav. about 0.95; odor slight; taste oily, afterwards acrid and burning. Croton oil is soluble in 1 part, but only partly soluble in 7 parts of absolute alcohol, it dissolves more readily in alcohol when old than when fresh.

Constituents.—Glycerides of formic, acetic, isobutyric, tiglinic ($C_5H_8O_2$), valerianic, lauric, myristic, palmitic, and stearic acids; also crotonol, $C_{18}H_{28}O_4$ (?). The purgative principle is insoluble in alcohol; the vesicating properties are not due to free acids, but to a fat, the acid of which is closely related to oleic and ricinoleic acids.

Properties.—Powerful purgative, irritant, rubefacient. *Dose*, 0.016 to 0.12 gram (gr. ¼–ij), in fixed oil or emulsion; externally as an addition to liniments.

OLEUM RICINI.—Castor Oil.

Origin.—Ricinus communis, *Linné*. *Natural order*, Euphorbiaceæ.

Habitat.—India; cultivated.

Production.—The seeds are crushed, freed from integuments by winnowing, kiln-dried, and expressed; the oil is clarified by mixing with warm water and decanting. Yield by cold pressure about 30 per cent., by warm pressure about 45 per cent.

Description—Viscid, transparent after filtration, nearly colorless; congeals near —18° C. (0° F.); spec. grav. 0.96; odor mild, rather mawkish, taste slightly acrid; soluble in an equal weight of strong alcohol, partly soluble in petroleum benzin.

Constituents.—Ricinolein and palmitin; acrid principle.

Properties.—Demulcent, purgative. *Dose*, 4 to 16 or 32 grams (ʒj–iv–℥j).

OLEUM GOSSYPII SEMINIS.—Cotton-seed Oil.

Origin.—Gossypium herbaceum, *Linné*, etc. *Natural order*, Malvaceæ.

Habitat.—Asia and Africa; cultivated.

Production.—The seeds are expressed and the crude red-brown oil is bleached with boiling water, followed by a little alkali. Yield 15–20 per cent.

Description.—Yellowish or yellow; neutral; congeals below 0° C. (32° F.); odor and taste mild, nutty.

Constituents.—Olein, palmitin, and non-saponifiable yellow coloring matter.

Properties.—Demulcent.

OLEUM SESAMI.—Benne-seed Oil.

Origin.—Sesamum indicum, *Linné.* *Natural order*, Pedaliaceæ.

Habitat.—India; cultivated.

Production.—The seeds are expressed; yield 45–50 per cent.

Description.—Yellow, limpid, transparent; spec. grav. 0.92; congeals at about —5° C. (23° F.); nearly inodorous, bland; colored green, red and brown-red on being agitated with a cold mixture of sulphuric and nitric acids.

Constituents.—Olein, myristin, palmitin, stearin; resinoid compound.

Properties.—Demulcent.

OLEUM LAURI.—Laurel Oil. Oil of Bays.

Origin.—Laurus nobilis, *Linné.* *Natural order*, Lauraceæ.

Habitat.—Levant and Southern Europe.

Production.—The fruit is steeped in hot water and expressed.

Description.—Of the consistence of butter, green, granular; melts near 40° C. (105° F.), odor strongly aromatic; taste aromatic, spicy; coloring matter and aromatic principle soluble in alcohol; this solution is not colored red by ammonia (turmeric).

Constituents.—Laurin, olein, chlorophyll, volatile oil, resin.

Properties.—Stimulant, nervine; used in liniments and ointments.

OLEUM MYRISTICÆ EXPRESSUM.—EXPRESSED OIL OF NUTMEG.

Oleum nucistæ. Butyrum nucistæ. Nutmeg butter.

Origin.—Myristica fragrans, *Houttuyn.* *Natural order*, Myristicaceæ.

Habitat.—Molucca Islands; cultivated.

Production.—Crushed nutmegs are expressed between hot plates; yield 28 per cent.

Description.—In blocks, of the consistence of tallow, unctuous, marbled whitish and orange-brown; spec. grav. 0.995; fusing point near 45° C. (113° F.); odor aromatic; taste spicy; soluble in 4 parts of hot strong alcohol.

Constituents.—Myristin, myristic acid, soft fat, volatile oil, coloring matter.

Properties.—Stimulant, carminative, digestive. *Dose*, 0.3 to 1 gram (gr. v–xv), in emulsion; mostly used externally.

OLEUM THEOBROMÆ.—OIL OF THEOBROMA.

Butyrum (Oleum) cacao. Butter of cacao.

Origin.—Theobroma Cacao, *Linné.* *Natural order*, Sterculiaceæ, Buettnerieæ.

Habitat.—South America.

Production.—The seeds are deprived of the testa and expressed between heated plates; yield 35–45 per cent.

Description. — Yellowish-white, becoming white on keeping, harder than tallow, yet melting in the mouth; spec. grav. about 0.96; fusing point between 30° and 33° C. (86° and 91.4° F.), aromatic, of a bland chocolate-like taste. On dissolving 2 grams (gr. xxx) of the oil in 4 grams (ʒj) of petroleum benzin or of ether, by immersing the test-tube in water of 17° C. (62.6° F.), and afterward plunging the test-tube into water of 0° C. (32° F.), the mixture does not become turbid, and does not produce a granular deposit in less than three minutes.

Constituents.—Stearin, palmitin, laurin, arachin and olein, probably a little resin.

Properties.—Demulcent. *Dose*, 2 to 4 grams (ʒss–j), in emulsion; mostly used for suppositories and in ointments.

OLEUM PALMÆ.—Palm Oil.

Origin.—Elæis guineensis, *Jacquin.* *Natural order*, Palmaceæ.

Habitat.—Western Africa; cultivated in tropical America.

Production.—The fruit is heated with water and expressed.

Description.—Harder than butter, orange-red, bleached by exposure to light, and by rapidly heating to 240° C, (464° F.); fusing point 27° C. (80.6° F.); odor agreeable, violet-like; taste bland. It rapidly becomes rancid, and acquires an acid reaction, a higher melting point, and an acrid taste.

Constituents.—Palmitin, olein, coloring matter.

Properties.—Demulcent; used in ointments, mostly for soap and candles.

OLEUM GYNOCARDIÆ.—CHAULMUGRA OIL.

Origin.—Gynocardia (Chaulmoogra, *Roxburgh*) odorata, *R. Brown.* *Natural order*, Bixaceæ.

Habitat.—Malayan peninsula.

Production.—The seeds are boiled in water and expressed.

Description.—Of the consistence of tallow, brownish-white, of an acid reaction; fusing point about 40° C. (104° F.); odor peculiar; taste acrid; partly soluble in cold alcohol; by sulphuric acid colored red-brown, afterwards olive-green; after agitation with warm water, the oil separates as a milky emulsion.

Constituents.—Albuminoids; glycerides of cocinic, hypogæic, palmitic, and gynocardic ($C_{14}H_{24}O_2$) acids, the last two also in the free state. The acrid taste and reaction with sulphuric acid are due to gynocardic acid.

Properties.—Alterative, emetic. *Dose*, about 0.3 gram (gr. v), in emulsion or dissolved in other oils.

OLEUM COCOIS.—COCOANUT OIL.

Origin.—Cocos nucifera, *Linné.* *Natural order*, Palmaceæ.

Habitat.—Tropical countries.

Production.—The seeds are boiled with water and expressed.

Description.—Of butyraceous consistence, white; melting point about 25° C. (77° F.); odor disagreeable; becomes rapidly rancid.

Constituents.—Glycerides of lauric (predominating), with palmitic, myristic, caprinic, caprylic, and capronic acids.

Properties.—Demulcent; mostly used for soap.

BUTYRUM.—BUTTER.

Origin.—Bos Taurus (femina), *Linné*. *Class*, Mammalia. *Order*, Ruminantia.

Habitat.—Domesticated.

Production.—The cream rising upon cows' milk is churned.

Description.—Soft, yellow, neutral, fusing point near 28° C. (82.4° F.), congealing point 26.5° C. (79.7° F.), rising to 32° C. (89.6° F.); odor delicate and sweet; taste bland. For medicinal use, butter should be freed from salt and casein by melting it in warm water and decanting the clear liquid. 100 parts of pure butter on being saponified by an alkali, and the soap decomposed by hydrochloric acid, yield fatty acids, which, after washing and drying, weigh between 85 and 88 parts.

Constituents.—Odorous principle a trace, olein about 30 per cent., palmitin and stearin about 68 per cent., and about 2 per cent. of the glycerides of butyric, capronic, caprylic, and caprinic acids. Butter having an acid reaction contains free butyric acid.

Properties.—Demulcent, lenitive; used as a dietetic and in ointments.

ADEPS.—LARD.

Axungia porci.

Origin.—Sus scrofa, *Linné*. *Class*, Mammalia. *Order*, Pachydermata.

Habitat.—Domesticated.

Production.—The fat attached to the mesentery, omentum, and kidneys is melted with water and strained.

Description.—Soft, white, neutral, spec. grav. 0.938; melting point near 35° C. (95° F.); odor faint; taste bland; completely soluble in ether. Distilled water boiled with lard does not acquire an alkaline reaction, is not precipitated by silver nitrate, and is not colored blue by iodine.

Properties.—Demulcent, lenitive; used in ointments and cerates.

SEVUM.—SUET.

Sevum ovillum.

Origin.—Ovis Aries, *Linné.* *Class*, Mammalia. *Order*, Ruminantia.

Habitat.—Domesticated.

Production.—The internal fat is melted in a water-bath and strained.

Description.—Solid, smooth, white, neutral; melting point above 45° C. (113° F.); congealing point about 37° C. (98.6° F.), rising to about 40° C. (104° F.); odor slight; taste bland.

Constituents.—Stearin and palmitin (predominating), olein, and hircin.

Allied Fat.—Sevum bovinum, the internal fat of Bos Taurus, *Linné.* Like the preceding, but melting point near 40° C. (104° F.); contains more palmitin, no hircin.

Properties.—Lenitive; used in cerates.

CETACEUM.—SPERMACETI.

Origin.—Physeter macrocephalus, *Linné.* *Class*, Mammalia. *Order*, Cetacea.

Habitat.—Pacific and Indian Oceans.

Production.—The fat contained in cavities in the head is allowed to congeal, expressed, and remelted in water.

Description.—White, translucent, slightly unctuous masses; fracture scaly-crystalline, of a pearly lustre; pulverizable in the presence of a little alcohol; spec. grav. 0.94 to 0.95; melting point near 50° C. (122° F.); congealing point near 45° C. (113° F.); soluble in ether and in boiling alcohol.

Constituents.—Mainly cetylic palmitate or cetin, $C_{16}H_{33}.C_{16}H_{31}O_2$.

Properties.—Lenitive; used in ointments and cerates.

CERA.—WAX, BEESWAX.

Origin.—Apis mellifica, *Linné.* *Class*, Insecta. *Order*, Hymenoptera.

Production.—The honeycomb, after draining the honey, is melted in water and the melted wax decanted. It is bleached by exposing the wax in thin sheets to moisture and sunlight.

Description.—Cera flava, Yellow wax. Yellow or somewhat brownish-yellow, breaking with a granular fracture at and below 10° C. (50° F.), becoming plastic by the heat of the hand; spec. grav. 0.96 to 0.97; melting point between 62° and 63° C. (about 145° F.); congealing with a smooth and level surface; odor aromatic, honey-like; taste mild; soluble in boiling ether and in chloroform; partly soluble in cold ether, benzol, and benzin, and in hot alcohol.

Cera alba, White wax. Yellowish-white circular cakes somewhat translucent in thin layers, brittle in the cold, but becoming plastic by the heat of the hand; melting point 65° C. (149° F.); odor slightly rancid.

Constituents.—Aromatic and coloring matters in yellow wax; cerin or cerotic acid $C_{27}H_{54}O_2$, 10 to 20 per cent. (crystallizes from boiling alcohol); myricin or myricyl palmitate, $C_{30}H_{61}.C_{16}H_{31}O_2$ (acicular crystals, slightly soluble in hot alcohol, soluble in hot ether).

Adulterations.—Tallow renders wax softer and lessens its specific gravity. Paraffin is not destroyed by hot sulphuric acid; 5 grams of the wax are heated in a flask for fifteen minutes with 25 grams of sulphuric acid to 160° C. (320° F.), and the mixture is diluted with distilled water: a layer of paraffin should not be separated. Resin is dissolved by hot 70 per cent. alcohol, and, after cooling, is precipitated by water. Mineral and starchy substances are insoluble in chloroform.

Properties.—Protective; used in ointments, cerates, and plasters.

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